Liability Allocation among the Parties to Fixed-Price Construction Contracts in Saudi Arabia

by

Maher Talat Al-Barghouthi

A Thesis Presented to the

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In Partial Fulfillment of the
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In

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COLLEGE OF GRADUATE STUDIES

This thesis, written by MAHER TALAT AL-BARGHOUTHI under the direction of his Thesis Advisor and approved by his Thesis Committee, has been presented to and accepted by the Dean of the College of Graduate Studies, in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE IN CONSTRUCTION ENGINEERING AND MANAGEMENT.

Thesis Committee

Thesis Advisor
Dr. Sadi Assaf

Member
Dr. Abdulmohsen Al-Hammad

Member
Dr. Osama Jannadi

Department Chairman 14/1/95.

Dean, College of Graduate Studies

16.1.95
Date

COLLEGE OF GRADUATE STUDIES

This thesis is dedicated to my parents, my wife and my son BASEL.

ACKNOWLEDGEMENT

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I wish to express my appreciation to Dr. Sadi Assaf who served as my major advisor. I also wish to thank the other members of my Thesis Committee, Dr. Abdulmohsen Al-Hammad and Dr. Osama Jannadi.

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THESIS ABSTRACT

NAME: MAHER TALAT AL-BARGHOUTHI

TITLE: LIABILITY ALLOCATION AMONG THE PARTIES TO FIXED-PRICE CONSTRUCTION CONTRACTS IN SAUDI ARABIA

MAJOR CONSTRUCTION ENGINEERING AND MANAGEMENT

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This thesis discusses the issue of liability allocation among the parties to fixed-price construction contacts in Saudi Arabia. It focuses on the Public and Semi-public sectors. A survey was conducted using the principles of quota sampling where 52 questionnaires were distributed to 10 owners from both sectors, 6 consultants and 36 contractors. The survey comprised of two parts. The first constituted of a tabulation of all liabilities found in actual local contracts. Respondents were asked to allocate liabilities to the party that best controls it, which may differ from actual allocation. The second part constituted of 25 statements. This part included either liabilities that were not covered in actual contracts or liabilities that were of controversial nature. Respondents indicated their level of agreement on a 5-level scale in addition to a "no opinion" response. The first part resulted in a matrix reflecting a comparison between actual and proposed liability allocation. The second produced discussion of liability areas not covered by local contracts, proposed changes to current contracts and a conclusion that proper liability allocation may lead to better bids through more competition and less contingency.

MASTER OF SCIENCE DEGREE

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خلاصة الرسالة

الاســـــم : ماهر طلعت البرغوثي

العنـــوان : تحديد المسؤوليات القانونية على أطراف عقود التشيـــيد ذات السعرالمحدد في المملكة العربية السعودية .

التخصـــص : هندسة وادارة التشييد .

يستعرض هذا البحث موضوع تحديد المسؤوليات القانونية على أطراف عقود التشييد ذات السعر المحدد في المملكة العربية السعودية حيث يركز على القطاعين العام وشبه العام . قام الباحث بتوزيع (٥٢) استبياناً مستخدماً مباديء الحصص النسبية في اختيار العينات الاحصائية حيث اشتملت العينة على (١٠) مندوبي ملاك و (٦) استشارين و (٣٦) مقاولاً . هذا ويتألف الاستبيان من جزئين أولهما يتكون من جداول أدخلت بها المسؤوليات القانونية الموجودة في عقود التشييد المحلية وقد طُلب من المجيبين تحديد الطرف الذي يسيطر سيطرة مثلى بجانب كل مسؤولية حيث أن هذا التحديد يمكن أن يختلف عن التحديد المتبع في العقود المحلية . أما الجزء الثاني فيتكون من (٢٥) عبارة تكونت من المسؤوليات التي لم تذكر في العقود المحلية ومسؤوليات ذات طبيعة مثيرة للجدل . حدد المجيبون مستوى موافقتهم مع كل عبارة على سلّم خُماسي المستويات بالاضافة الى اجابة « بدون رأي » نتج عن الجزء الأول جداول بها مقارنه بين التوزيع الحالي والتوزيع المقترح للمسؤوليات القانونية . أما الجزء الثاني فقد نتج عنه استعراض للمسؤوليات التي لم تحدد في العقود المحلية والتغيرات المقترحة على التوزيع الحالي للمسؤوليات كما تم استنتاج أن التوزيع الأمثل للمسؤوليات القانونية سيؤدي الى عطاءات أفضل نتيجة لزيادة المنافسة وقلة الأموال المحددة للمشاكل الغير متوقعة في العطاءات .

درجة الماجستير في العلوم

جامعة الملك فهد للبترول والمعادن

الظهران ـ المملكة العربية السعودية

رجب ١٤١٥هـ

CHAPTER 1

INTRODUCTION

1.1 General

It is one of the facts of the construction industry that each project is unique in the sense that it has to be custom designed and built.

The parties to a construction contract; namely, the designer or consultant, the owner, and the contractor join forces to bring to life a project conceived in the owner's mind, detailed by the designer and carried out by the contractor. All of the parties have one common goal; which is to complete the project; however, each of them has his own interests to protect.

Due to the diversity of each construction project, each of the parties face a magnitude of responsibilities.

Failure to carry out activities delineated by such responsibilities may jeopardize the interests of another party . This may lead to suffering, be it financial or physical.

Allocation of such responsibilities among the parties should generate better understanding and hence, reduce claims which, in effect, leads to a successful project with regards to finance and schedule.

1.2 Statement of the Problem

Liability is defined as the condition of being responsible for a possible or actual loss, penalty, evil, expense or burden.

The issue of liability in construction, in essence, sets to answer the following question: *Who is liable and for what?* However, proper liability allocation means that liabilities should be assigned to the party that best controls it.

Since construction projects are unique in nature and has to be custom designed and built, problems are inevitable. Each party feeling the existence of such problems, tries to use contractual language or clauses to set the burden on another party.

The above statement is especially true for the owner using hold harmless contractual clauses. This, at least hypothetically for the time being, would increase the risks and responsibilities of the other parties, especially the contractor, and hence, would inflate the cost of performing the project.

This leads to the formulation of the following statement of the research problem:

1. Who is liable and for what? A study of liability allocation in the theoretical sense.
2. How is liability being allocated or shared in actual construction contracts in Saudi Arabia?
3. What are the financial/schedule effects of liability fixing?
4. How to reduce such effects with emphasis on Saudi construction contracts?

1.3 Significance of the Study

If an answer to the questions formulated above is to be found, it becomes easier for the contractual parties to assume or even share liability without having to fix it on another. This, in effect, should lead to the following:

1. Better understanding of each party to its responsibilities.
2. Reduce or eliminate avoidable schedule delays.
3. Avoid or reduce damages to outside parties.
4. Reduce or eliminate claims.
5. Overcome the almost inevitable adversarial relationship among them.

1.4 Objectives

The main research objectives are summarized as follows:

1. To study how liability is being allocated and/or shared among the contractual parties both in theory and in practice. Emphasis shall be made on the Saudi construction environment.
2. To study the impacts of improper liability allocation on various aspects; mainly cost and schedule.
3. To produce proper sharing and/or allocation of liability which reduces loss.

1.5 Scope and Limitation

This research shall be limited to study only the owner, the designer or consultant referred to as A/E, and the contractor. The construction manager (CM) shall not be considered due to the fact that it almost does not exist in the Saudi construction industry.

Emphasis shall be made on large construction projects in both the public (Government agencies) and semi-public (i.e. Saudi Aramco, SCECO,...) sectors. The private sector shall be eliminated due to the following reasons :

1. Contracts in this sector are usually crude and lack detail.
2. Projects are usually smaller in both magnitude and scope.
3. Schedule is usually not given the same significance as it is the case in the other sectors.
4. Owners are usually inexperienced and go through construction once or twice only. This would lead them to fix liability on the contractor . Getting

data from them would not help us determine the proper liability sharing or allocation and hence; may jeopardize the outcome of the research.
5. Contractors and designers dealing with this sector are, in most cases, not as obligated to schedules and standards as the case with the other sectors.

The study of which contractual arrangement is best for the Saudi contractual environment is beyond this scope. However, emphasis shall be made on the type most commonly used throughout the world, and most certainly in Saudi Arabia, i.e. fixed-price contracts.

The following may answer why fixed-price contracts are so liked by owners (Rubin, 1983):
1. It gained respectability with owners, especially private owners, because, to them, it poses less risk than any other arrangement.
2. Since the risk sits mainly with the contractor, many owners feel this is the safest contractual arrangement to do construction with. Public officials use it as a shield against favoritism and wasting government funds.
3. Owners have the best handle on the final cost.

1.6 Thesis Organization

The first objective deals with the allocation and/or sharing of liabilities among the contractual parties in theory and in practice. Emphasis is made

on the Saudi construction environment. Chapter 2 deals with the theoretical aspects of this objective. Chapter 3 describes the methodology for surveying the opinion of contractors, A/Es and owners. Chapter 4 discusses the results obtained from the liability allocation matrix obtained from public and semi-public contracts. Towards the end of this chapter, the researcher identifies improper liability allocation and its impacts on cost and schedule and; hence, satisfies the second objective. Also, the researcher suggests proper sharing and/or allocation of liability which intends to reduce loss and; hence, satisfy the third objective.

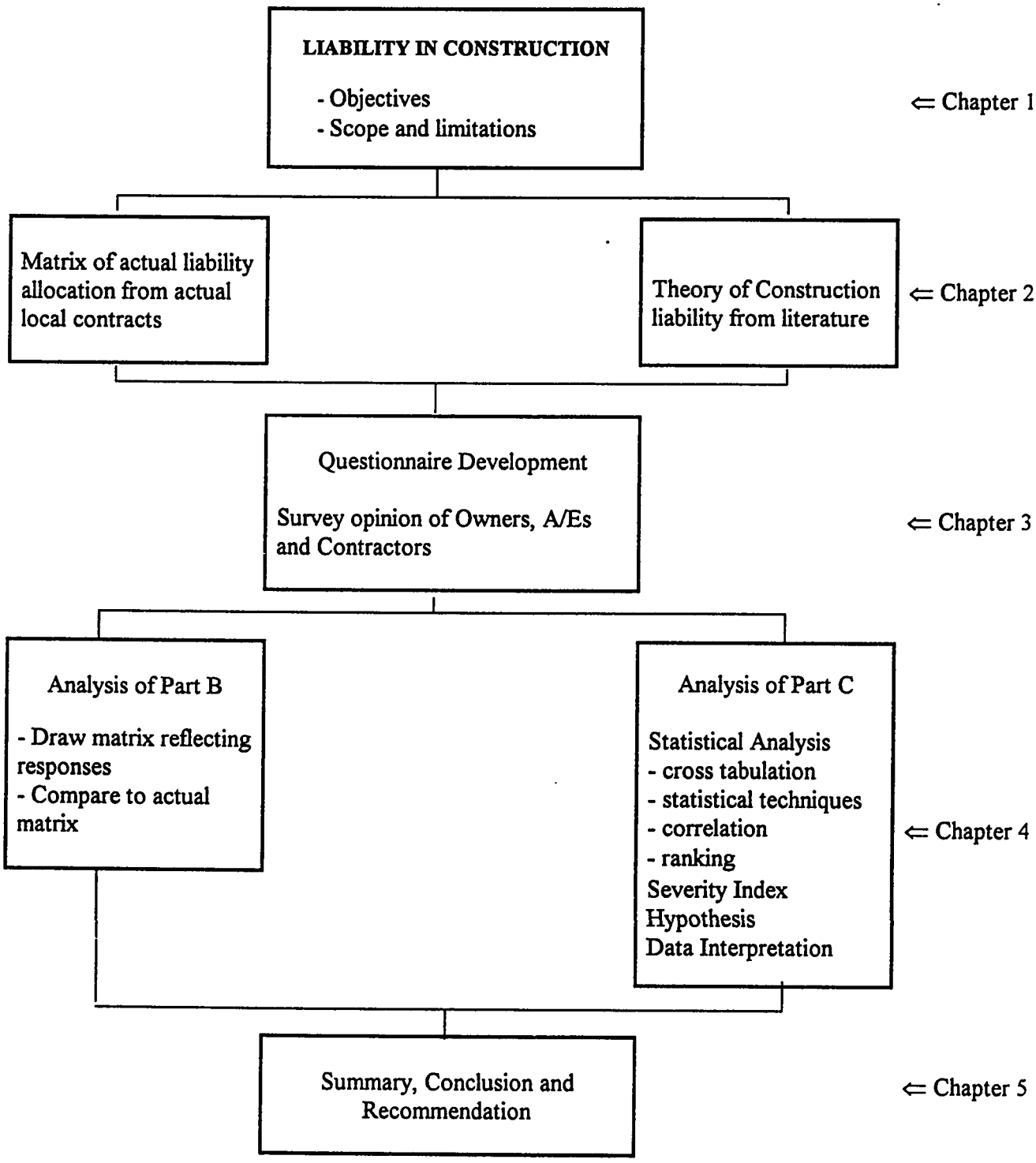

Figure 1.1 Thesis Organization

CHAPTER 2

LIABILITY IN FIXED-PRICE CONSTRUCTION CONTRACTS

2.1 General

This chapter tackles the labilities and responsibilities of the key construction parties; namely, the owner, the design consultant or the A/E, and the construction contractor. In this chapter, various areas of liability are identified.

2.2 The Contractual Agreement

Perhaps the most important phases of any construction project are the design or engineering phase and the construction phase. Here, traditionally, the owner enters into contractual agreements with an A/E to complete the design and with a contractor to carry out or construct that design.

Almost all the liabilities of each party are, or at least should be, stipulated in the contract document; therefore, it is worthwhile to look deeper into the contract itself. "Legally, a contract may be defined as an agreement by two or more competent parties to do or not to do some lawful act(s). In order to have a binding contract there must be an offer and an acceptance" (Colby, 1976).

Max Greenberg, a prominent lawyer specializing in construction contracts looks at the contract as a "dangerous instrument that should always be approached with trepidation and caution. Theoretically, the aim of a written contract is to achieve certainty of obligation of each party, the avoidance of ambiguities, and such definiteness of understanding as to preclude ultimate controversy. In practice, such contracts are generally framed, not to definitely fix obligations but to avoid obligations" (O'Brien, 1976). There is an attempt by the owner or A/E to pass all liabilities to the contractor; to avoid responsibility for uncertainties and possible design or computation errors. The idea being that the owner can thereby firmly establish his costs and that owner and A/E can avoid liability for error.

The above is accomplished by exculpatory clauses such as "borings are not guaranteed; they shall not be deemed part of the contract documents"; "adjoining structures shall be supported, if required"; "contractor shall be liable for damage to adjoining streets, highways or structures". The inclusion of exculpatory clauses is often a sign of lack of professionalism on the part of the owner or his agents. It represents an evasion of responsibility and an improper allocation of liability.

Such one-sided contracts have serious cost consequences that owners do not appreciate; firstly, it may discourage competent contractors form bidding and; secondly, contractors may include, in their bids, substantial contingencies to overcome the liability imbedded in those exculpatory clauses. Some contractors, however, commit a major mistake by leaping to the plans and specifications without carefully considering the terms of the general conditions. Most of the liability is bound here.

Unlike the contract between the owner and the A/E, the contractor has little voice in the contract choice. It is his responsibility, however, to assess all risks and liabilities correctly if he wants to stay in business. On the other hand, owners have legitimate concern with self-protection through the contract. Many owners tend to include harsh protective clauses that amount to an ill-advised defense and instead are breeding grounds for claims (Rubin, 1983).

2.3 Advantages of Proper Liability Allocation

Success of a competitive bid contract is almost fully dependent upon the degree of competition generated. The higher the number of contractors competing for the contract, the higher the degree of competition and hence the cost will most probably be lower.

Liabilities that owners pass on to prospective bidders via the contractual language play a significant role in either restricting or enhancing the degree of competition.

Many owners may elect a "liability-free" policy by shifting all liabilities to the bidders. Here, the owner hands out plans and specifications and asks the bidders to quote a price to construct the project. Bidders will be held to that price regardless of anything that occurs, whether it is their fault, the A/E's or the owner's.

Owners may argue that by shifting all liabilities to the contractors they would be able to fix the construction cost, which counts for most of the entire project's cost, for better budget appropriation and budget control. This policy poses a great risk on the owner. It will most likely result in a fewer number of bidders and hence; a higher cost.

Some liabilities should obviously be borne by the owner; such as, full disclosure of known information, site access, prompt checking and approving of shop drawings and timely payments. The owner who thinks of evading such liabilities is engaged in self-delusion and will certainly pay for such evasion in the form of higher costs.

By the same token, there are liabilities to be borne by the contractor such as project scheduling, construction methods, material procurement, site safety and timely completion.

There are, also, areas of liabilities that should be shared by both the owner and the contractor; such as the escalation of cost. This should generate more competitive bids due to lower contractor contingencies.

The previous discussion establishes that proper liability allocation shall result in better bids and most likely a lower cost to the owner. Also, it shall enhance the adversarial relationship between the owner and the contractor and hence; result in fewer claims.

2.4 Liabilities in the Design Phase

It is intended by this section to describe some of the liability issues in the design phase.

2.4.1 Owner-Provided Data

Although the owner may have legitimate concern to have the A/E check existing installations, he may be incurring additional costs and contingencies by having the A/E check drawings that are adequately accurate. Owner usually submit as-built drawings, operation drawings, isometric drawing, ... etc.

2.4.2 Adequacy of Design

The A/E should be found liable for his design (i.e. plans and specifications). If he possesses the required knowledge and skill but does not utilize it; he is charged with negligence; and if does not posses such knowledge and skill, he is liable for the lack of it (Walker, 1979).

Should the A/E provide inadequate plans and specifications, he should be liable for rectifying such inadequacy. Provisions should be made in the contract between the owner and the A/E to establish the amount the latter is liable for and the duration of warranty of his design.

2.4.3 Accuracy of Design

Plans and specifications of a poor quality will cause construction problems and delays. The A/E's professional obligation is to strive to make the plans and specifications as clear as possible to preclude coordination problems, errors and omissions in construction. However, the A/E is not held liable to absolute accuracy in performing his professional duties, nor does he warrant the perfection of his design package. The law requires only the exercise of ordinary skill and care in light of present-day knowledge.

The owner, in the construction phase, should imply a warranty of design by undertaking that satisfactory performance will result if the design is complied with. Basically, this warranty states that a contractor who bids on the basis of this design package has the right to depend on it to accurately achieve the required performance. Otherwise, the contractor should be entitled to proper compensation for any additional cost (O'Brien, 1976).

Although it is clear that the A/E should be liable for his design, most construction contracts try to shift the liability of such errors and omissions to the contractor via the use of exculpatory language. This matter is further discussed under 2.5.13.

2.4.4 Owner Abandons Work

Should the owner decide to abandon the project while in the design stage, the A/E should be entitled to recover not only that portion of his fee which he has actually earned up to the date of abandonment by the owner, but also damages for the loss of opportunity of which he was deprived as a result of being prevented by the owner from completing his services. The proper measure of such damages should be the loss of profits which he would have earned in the future under the contract (Walker, 1979).

2.4.5 A/E's Liability for Accuracy of Estimate

If the owner requires that the A/E furnishes an estimate and it was found to be grossly erroneous, the law may hold the A/E liable for and damages suffered by the owner, and he may forfeit his compensation if the final cost is substantially in excess of his estimate (Walker, 1979).

2.4.6 A/E's Liability for Construction Cost

If the contract between the A/E and the owner stipulates that the project to cost not more than a restricted amount, the A/E, normally, may be liable for the amount of his compensation if his design package will cost substantially in excess of that amount. Although a slight variance may not jeopardize the A/E's compensation, a substantial variance would be considered a breach of contract (Walker, 1979).

2.5 Liabilities in the Construction Phase

In this section, a brief discussion of the various liability areas is intended.

2.5.1 Bid Evaluation

Public owners are governed by governmental laws and regulations pertaining to contract procurement. They do not usually have the freedom of selecting a bidder who is not the lowest. On the other hand, semi-public owners have more flexibility to chose any contractor, not necessarily the lowest. In their instructions to bidders, they reserve the right to reject any or all bids for any reason whatsoever or for no reason.

Should the owner be liable to compensate bidders if they bid and then he abandons work? Or, should owner compensate the lowest bidder if it decides not to award him the contract?

2.5.2 Disclosure of Information

Perhaps one of the basic liabilities of the owner is to disclose all information necessary for the proper execution of work. Not doing so, the contractor may enter a bid for less than he might have should he had the full picture. This would either result in a dispute resulting in a claim or the contractor would justify to himself other means for regaining some of his losses; such as cutting corners.

2.4.3 Safety

As a general rule, an owner who undertakes the design and construction of a certain project and employs a competent contractor, should not be liable for any unsafe occurrence caused by the failure of the contractor to follow required safety rules and regulations or the failure of the A/E to properly design the project (Walker, 1979). U. S. A. court cases proved this rule. Owner was relieved of negligence and liability was placed on either contractor or A/E.

Projects should be designed with safety as a main criterion. Also, contractors must strive for the safe construction of the project. A/Es and contractors should be, each for his actions, liable for safety, basically because they should have more experience than the owner. Therefore, contractors should include safety in their bids and should not attempt to cut corners especially on the account of safety in order to reduce cost. Should the owner exert pressure on the contractor to execute a certain task, whether expressed or implied, in an unsafe manner, the contractor should not comply and that should not constitute a breach of contract.

2.5.4 Specifications

The liability can change significantly when using detailed specifications or performance specifications. The following example illustrates the idea. In one case, the contractor might be asked to build a roof according to the detailed instructions in the plans and specifications or; in another case, he might be asked to build a "watertight" roof. If the roof is built exactly

according to the first case and still leaks, the contractor's obligation has been satisfied and the owner and the A/E are liable to come up with a solution to repair the condition at no cost to the contractor. If the contractor is working with the latter specification, then the liability is all his if the roof leaks (Rubin, 1983).

2.5.5 Shop Drawings, Samples and Materials

The owner, or his agent, review of shop drawings, samples and materials usually takes tremendous amount of time. It is usually for the owner, or his agent, to approve them with a disclaimer to the effect that it has been reviewed and either no defect has been noted, or those that have been noted are identified on the drawings. However, the disclaimer precedes to say that these notations are not necessarily complete nor do they remove the requirement that the contractor meet all appropriate scope and requirements of the contract as well as all standard safety practices. Court cases in the U. S. A. did not place liability on the owner or his agent for defects in shop drawings, samples and materials (O'Brien, 1976).

Since the owner, or his agent, usually consume tremendous time to review and "approve" these submittals, then the owner should be liable for any delay caused by this approval. Therefore, a schedule or time frame for submitting by contractor and approving by the owner should be contractually established.

Another argument may be, if the owner is not liable for the data presented, then why does he consume time reviewing it. To answer;

firstly, the owner may disapprove a certain submittal and hence, the contractor has to resubmit; secondly, it is a method to make the owner confident that the contractor did not "cut corners" and thirdly, the owner may modify to include things the contractor may have omitted in his submittal.

2.5.6 Differing Site Conditions

It is common in construction contracts to find various exculpatory clauses to shift the liability for site conditions to the contractor. It provides that neither the owner nor the A/E accepts liability for the accuracy or completeness of site conditions especially subsurface soil and water conditions. It also provides that bidders are expected to satisfy themselves as to the character, quantity and quality of subsurface materials to be encountered.

It is encouraging, on the other hand, to see that some owners (in U. S. A.) are including the "differing site conditions clause". This clause returns the liability for differing or unknown conditions to the owner where it rightfully belongs. No contractor can be expected to have investigated the owner's site exhaustively before placing his bid. This clause allows the reimbursement for unforeseen site conditions that affect the cost of work and/or cause schedule delays. Although this clause should be included in the contract, contractors should not take its inclusion for granted. Owners should consider it as insurance against claims and high bids (Sweet, 1977).

It may be worth mentioning that the owner and the A/E intentions would be questionable should they include exculpatory clauses to evade liability for subsurface conditions. This is due to the fact that they had enough time to thoroughly investigate subsurface conditions as part of the design package. It also does not make much sense to ask the contractor to investigate subsurface conditions during the bidding period.

2.5.7 Variation in Quantity

Fixed contracts may incorporate unit-pricing. Here, the owner sets estimated quantities of materials needed to accomplish an activity. The key is the degree to which quantities can be reasonably estimated. If the actual quantity is significantly lower than estimated, the contractor may not be able to recover his fixed cost. If, on the other hand, the quantity is significantly higher, the contractor may incur loss due to change in method.

The "Variation in Quantity Clause" is a way to deal with the liability involved in the unit-price element of the contract. This clause distributes the liability by setting a limit on how much the estimated quantity is allowed to vary before adjusting the price (Rubin, 1983).

There is no doubt that this clause, if properly administered, spread the construction liability more equitably and protect the contractor against loss and the owner against higher contingency bids.

2.5.8 Escalation

Some contracts provide escalation clauses. These clauses allow reimbursement to the contractor for steep increases in labor or material costs over a "long" period of time. Sometimes, these clauses mention a time period after which escalation applies, usually more than one year. It is reasonable to assume that a contractor cannot account for these increases in his bid; otherwise, he may end up increasing his contingency.

Basically, these clauses seem fair treatment of the contractor and protects the owner against excessive contingency in bids. However, in the absence of such clauses, the contractor who takes enormous losses, could default or could be looking to make up for the loss elsewhere, by cutting corners or through litigation. In all cases, the real loser is the owner (Rubin, 1983).

2.5.9 Owner Directives and Interference

The owner, or his agent, should be liable for any directive he gives to the contractor or any interference in his work.

Although many contracts have clauses stating that the owner, or his agent, will not be liable for damages due to delay for any cause, the courts (in U.S.A.) have generally found that active interference on the part of the owner constitutes a breach of contract, and thereby opens the way for the contractor to claim for damages (Rubin, 1983).

2.5.10 Changes

Principally, the owner must pay for what he gets or receives benefit from. Under this principal, contracts generally include a clause that gives the owner the right to order extras or changes in work.

This clause should include the extent of allowable change; i.e. x % of the contract value. Should changes exceed that percentage, the owner should compensate the contractor for damages due, mainly, to change on fixed costs or methods. Also, the contractor should be given a time extension for performing the change and should be compensated for the impact of the change on other activities, if any. Also, a time limit should be established for payment of these changes. Delaying the payment may cause cash flow problems for the contractor (Rubin, 1983).

Changes should always be properly documented even if good faith persists. The principal reason for documenting changes is that an oral agreement may not leave both parties with the same understanding of its conditions. Also, oral agreements are usually not binding by law.

Liability for unwritten changes or oral agreements usually belongs to the contractor. The reasons are; firstly, contracts usually include a clause that says that all changes must be properly documented; hence, oral changes constitute a breach of contract; secondly, the contractor may carry a change or perform any activity to the quality or method that he chooses and claim it was ordered by the owner.

Time extension, if required, should be established with the negotiation of each change order. The owner, or his agent, may tend to avoid negotiating time extensions especially when negotiating change orders claiming that time extensions cannot be issued until the actual delay is noted. This approach pushes off delay so that it must be considered as a lump. This is found to be unacceptable. Experience shows that this approach fails most of the time. It is much more reasonable to evaluate time impact on either individual change orders or by groups of change orders over a calendar period of time.

2.5.11 Schedule Delay

Contracts may include a "No Damage for Delay Clause". This clause would shift the liability for delays to the contractor. The courts in the U. S. A., in finding that a no damage for delay clause should not be enforced, look to both the unforeseeability of the cause, and the nature of the interference on the part of the owner (O'Brien, 1976).

It makes sense that the contractor should bear the consequences of the delay alone if it was caused by his actions, but, how much sense does it make if the delay was not caused by the contractor's actions?

Force majeure causes include acts of God, fires beyond contractor's responsibility, earthquakes, acts of the public enemy, acts of government, freight embargoes and delays of subcontractors or suppliers due to similar causes (O'Brien, 1976).

Can a delay be excused if it was caused by a force majeure? If not, is the contractor liable for either liquidated or actual damages caused by the delay? Is he required to accelerate to catch up with the lost time?

Both the American Institute of Architects (A.I.A.) contract and the Engineers Joint Contract Documents Committee (E.J.C.D.C) contract allow the contractor to claim time extension due to causes beyond his control. However, other contracts still use the "No Damage for Delay Clause" (Rubin, 1983).

Liability for force majeure causes should be shared between the owner and the contractor, mainly, due to the unforeseeabity of the happening.

Another aspect of delays is to look at the contractor's general liability towards it; namely, issuance of a notice of delay. The contractor is usually bound contractually to notify the owner in writing of any delay within a certain number of days from the beginning of the delay.

2.5.12 Weather

When considering liability for weather delays, contractor should bear liability for usual weather. However, in cases of severe or extraordinary weather shown to be beyond the average expected for the area based upon past records, the liability should be shared. The contractor, in such a case, should at least be allowed time extension (O'Brien, 1976).

2.5.13 Accuracy of Design

Most contracts contain disclaimers to shift the liability of the plans and specifications errors and omissions to the contractor. Proper liability for such errors and omissions should belong to the A/E because; firstly, he should have the expertise to produce a reasonably sufficient design; secondly, he had the time to think and study the project; thirdly, it is illogical for the contractor to virtually redesign the project to discover any error or omission and account for it during the bidding period; which is, only enough for the contractor to produce his bid.

2.6 Summary

This chapter discussed the issue of liability among the parties to a fixed-price construction contract from the theoretical point-of-view. Further, the points included in this chapter was considered when evaluating local contacts ahead in this research. Also, it was used for preparing the questionnaire and evaluating the results.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 General

This chapter describes the research methodology to survey the opinion of the parties to construction contracts in the local construction industry.

3.2 Questionnaire Design

Actual construction contracts from the public and semi-public sectors were studied from the allocation of liability point-of-view. Also, literature dealing with construction liability were screened to consider only those dealing with liability issues similar to those of the local construction industry. Having done that, it was necessary to survey the opinion of public and semi-public owners, design/consultancy or A/E firms and construction contractors.

Part A of the questionnaire is different depending on the party responding to it, i.e. owner, A/E or contractor. In it, the researcher asks a series of questions to make sure that the respondent meets the following qualifications:

Owners: 1) respondent must represent either the public or the semi-public sectors; and 2) he should show involvement in actual construction contracts, be it executing it and/or preparing it.

A/Es: 1) respondent's firm must have an annual engineering/design man-hours greater than 20,000; 2) his firm should have at least 50% of their work volume from public and semi-public sectors; and 3) he should show actual project execution experience in Saudi Arabia.

Contractors: 1) respondent must indicate his company's specialty(s) and classification according to the Ministry of Public Works and Housing classification. His company must, at least, be classified as 1, 2, or 3 in at least one specialty (appendix II); 2) contractor must have an average work force greater than 250; 3) his annual construction volume greater than SR 30 million; 4) at least 50% of his work volume should be with public and semi-public sectors; and 5) he must show actual construction experience in Saudi Arabia.

Liabilities found in local design/consultancy contracts and construction contracts formed Part B of the questionnaire. Here, respondents are requested to allocate liability to the party that best controls it which may differ from the way liabilities are being allocated. Part B has two sections, one for liabilities of the design/consultancy contract between the owner and the A/E and the second for liabilities of the construction contract between the owner and the contractor.

Areas of liability that are not covered in local contracts but covered in the literature and areas of controversial opinions were set in the form of 25 statements in Part C. Here, respondents are asked to indicate their level of agreement with each statement.

In parts B and C, the researcher used similar wording to local contracts in order to stay consistent with the liability matrix drawn from actual contracts in chapter 4.

3.3 Statistical Sampling

This research focuses on the public and semi-public sectors of the local construction industry. In other words, the private sector has been excluded due to reasons explained in Chapter 1. Following is a description of the survey population that meets the objectives of the study.

3.3.1 The Population

The population is divided into three strata; namely, the Owners stratum, the A/Es stratum and the Contractors stratum. The Owners stratum consists of 38 public agencies having separate construction projects budgets (Assaf et al) and 15 projects departments representing the semi-public sector such as Saudi Aramco and SCECO-East, Central and West. Therefore, the entire stratum consists of 53 agencies. The A/E stratum consists of 20 firms according to a Saudi Aramco listing of qualified General Engineering Services contractors and; finally, the Contractors stratum consists of 367 contractors having at least on classification in categories 1, 2, or 3 . Therefore, the entire population is represented by 440 possible respondents.

3.2.2 Sampling Techniques

Commonly, researchers would send questionnaires by mail to randomly selected respondents and wait for responses to be sent back by mail. This, however, proved to be tedious since the response rate is very low. To overcome that, researchers send more questionnaires and/or remind respondents to complete and return the questionnaire. In this thesis, the researcher utilized the concept of Quota sampling. By this, respondent selection was non-random in the sense that respondents did not have a known non-zero chance of being selected. The researcher selected companies/agencies and contacted them. They, then selected a person to respond to the questionnaire and return it. This process was done until the sample "quota" was satisfied.

Since the scope of this research is focusing on large contractors and A/Es and owners who have their own project management departments, a high level of professionalism can be safely assumed and; hence, risk of bias can be excluded. Table 3.1 shows the required sample size for each stratum obtained from the following equation (Schaeffer, 1990):

$$n = \frac{\sum_{i=1}^{3} \frac{N_i^2 p_i q_i}{w_i}}{N^2 D + \sum_{i=1}^{3} N_i p_i q_i} \qquad \text{(Eqn. 3.1)}$$

where an average value of $p = 0.8$ and $q = 0.2$ can be selected; $D = 0.0025$ and $w_i = N_i / N$.

TABLE 3.1 Stratified Quota Sample

STRATUM	STRATUM POPULATION	SAMPLE SIZE	PROP. OF POPULATION	PROP. OF SAMPLE
OWNERS	53	10	19%	19.2%
A/Es	20	6	30%	11.6%
CONTRACTORS	367	36	10%	69.2%
TOTAL	440	52	12%	100%

3.2.3 Scoring

Responses for Part B of questionnaire were presented in two tables; one for each type of contact showing the frequencies for all parties and the composite frequency (Appendix III).

In Part C respondents were asked to indicate their level of agreement on a 5-level scale in addition to a "no-opinion" response. In order to combine and rank responses, a severity index is used as shown by the following equation (Al-Hazmi, 1987):

$$I_S = \sum_{i=1}^{5} a_i x_i \qquad \text{(Eqn. 3.2)}$$

The constant a_i is used to determine a quantitative measure. This means that the respondent is limited to the 5-level scale while completing the questionnaire. The variable x_i is the frequency of the i^{th} statement.

The scale value assigned for each response is as follows:

$a_1 = 4/4$ for the "Strongly Agree" response

$a_2 = 3/4$ for the "Moderately Agree" response

$a_3 = 2/4$ for the "Agree" response

$a_4 = 1/4$ for the "Moderately Disagree" response

$a_5 = 0/4$ for the "Strongly Disagree" response

"No Opinion" responses were excluded from the frequencies.

A severity index of 100% means that all respondents chose the "Strongly Agree" response. On the other hand, a 0% severity index means that all respondents went for the "Strongly Disagree" response. This gives the range of 0-100% for the severity index.

3.4 Summary

This chapter demonstrated the design of the questionnaire and discussed the sampling technique required to survey the opinion of the local construction industry population of 440. A sample of 52 was selected and stratified to represent the three different strata.

CHAPTER 4

FINDINGS AND RESULTS

4.1 General

This chapter comprises of two main parts; the first tackles the study of liability allocation among the contractual parties in Saudi Arabia as described in the first objective of this study. In this part, a LIABILITY MATRIX summarizing the local liability allocation shall be drawn from actual contracts from the Saudi construction industry. The second part tackles the results and analysis of the data obtained from the distributed questionnaire. At the conclusion of this study, a proposed liability matrix shall be drawn. This matrix shall propose a better allocation of liability.

4.2 Actual Liability Allocation

Following is a discussion of the actual liability allocation as found in actual construction contracts from the public and semi-public sectors.

4.2.1 Liabilities in the Design Phase

It is intended by this section to describe some of the liability issues in the design phase as described in actual Saudi Public and semi-public design contracts.

4.2.1.1 Owner-Provided Data. The Saudi contracts reviewed stipulated that the dimensions and locations of existing and proposed installations shown on drawings provided by owner for A/E use are approximate only. The A/E is liable for checking and verifying data before starting his work.

4.2.1.2 Consultation. Contracts in Saudi Arabia concentrate on the consultant role of the A/E. The liability under this role is wide-ranged and ambiguous. Clauses mention that A/E has to advise owner of any inadequacies or errors in the contract between them. Also, he has to advise owner of anything that may conflict with local codes, ordinances, industry standards, or which in his opinion should be changed in order for the project to meet the design criteria. Public contracts also stipulate that A/E is liable for studies or information the owner or himself see necessary to complete the design. Also, both types of contracts require the A/E to recommend different feasibility alternatives from the economic and technical points of view and recommend, to the owner, the best of these alternatives.

4.2.1.3 Adequacy of Design. Semi-public contracts in Saudi Arabia establish that the A/E is liable to rectify all errors and/or omissions caused solely by his actions up to the value of the design contract. He also warrants his design one year after construction. Public contracts, on the other hand, say that A/E is liable to fix mistakes and for all damages that may result.

4.2.1.4 Owner Abandons Work. Contracts stipulate that owners may, with or without cause, suspend or even terminate the contract for convenience. The A/E receives compensation for actual incurred costs. A/E is not compensated for liquidated damages or loss of opportunity. This is an area of significant liability to the A/E. He may try to increase his contingencies or negotiate more man-hours than is really required.

4.2.1.5 A/E's Liability for Accuracy of Estimate. Public contracts in Saudi Arabia mandate that the A/E estimates construction and operation costs. Also, A/E is required to prepare a Bill of Quantity. There is no indication to the extent of A/E's liability should these estimates be grossly erroneous.

4.2.1.6 Surface and Subsurface Conditions. Both public and semi-public engineering/design contracts stipulate that A/E shall thoroughly investigate the general and local conditions at the site and determine their effect on the project. Such investigation, the contracts further stipulate, shall include, but not limited to, topography and ground surface conditions; subsurface conditions including the nature and quantity of obstacles and material to be encountered to the extent such conditions are not latent or concealed; availability of fill material and disposal sites, climatic conditions and storm data, tides, currents and any other condition which may affect the work. Contracts proceed to stipulate that A/E shall be entitled to rely upon data, soil reports and the local conditions provided by the owner. In other words, he is not liable for validating the data if given by owner.

The above make lots of sense. The A/E should be responsible for obtaining such data for the following reasons:

1. He is properly equipped to obtain and analyze the local surface and subsurface conditions;
2. He needs the information to start his design activities, and
3. He has the time to do it.

The thing that does not make sense, however, is throwing the liability on construction contractors to check, during the bidding period which is usually one month, all surface and subsurface conditions and be liable for the consequences should he fail to do so.

Why do owners provide data to A/Es and relieve them from checking its validity and not relieving the construction contractor of the same even after the data was gathered and analyzed by the A/E?

4.2.2 Liabilities in the Construction Phase

4.2.2.1 Differing Site Conditions. Unfortunately, the contracts studied in Saudi Arabia contain such exculpatory language. Following is an excerpt from an actual public contract: The contractor shall, at his own expense, perform the necessary inspection and examinations of the site and the surrounding area. He shall satisfy himself before submitting his tender (bid) as to all matters related to the form of the site, nature of the soil through conducting soil investigations and boreholes which enable him to do this. He should also review the quantities and nature of work as well as the materials required to accomplish the works, means of access to

the site and utilities he might need. By and large, he shall obtain for himself all the necessary information and other factors that might affect his tender.

Semi-public contracts have a similar clause, however, they mention that contractor is entitled to rely upon subsurface and soils data if provided by owner. If not, the contractor is liable to obtain as part of his bid. .

4.2.2.2 Changes. Principally, the owner must pay for what he gets or receives benefit from. This clause should include the extent of allowable change; i.e. x % of the contract value. Should changes exceed that percentage, the owner should compensate the contractor for damages due, mainly, to change on fixed costs or methods. Also, the contractor should be given a time extension for performing the change and should be compensated for the impact of the change on other activities, if any. This provision is not found in contracts in Saudi Arabia.

Public owners reserve the right to increase work up to 10% or decrease it by up to 20% of the contract value. Semi-public contracts, on the other hand, do not limit the upward or downward change.

Also, a time limit should be established for payment of these changes. Delaying the payment may cause cash flow problems for the contractor.

Changes should always be properly documented even if good faith persists. The principal reason for documenting changes is that an oral agreement may not leave both parties with the same understanding of its

conditions. Also, oral agreements are usually not binding by law. This is clearly stipulated in contracts in Saudi Arabia.

4.2.2.3. Schedule Delays. Semi-public contracts provide the same definition for force majeure as given in subsection 2.5.11; however, contracts stipulate that neither party shall be liable to the other for costs incurred by the other as a result of any delay or failure to perform arising out of force majeure. In addition, should the work be delayed more than (45) consecutive days as a result of force majeure, then owner shall either suspend or terminate the contract.

Public contracts refer to force majeure as special risks. The definition of such risks is limited to the outbreak of war, invasion from enemy forces, military operation and others. There is no clear mention or implication of force majeure causes in chapter 2. The contract stipulates that contractor shall have the right to be paid by the owner the value of work or temporary work or material designated for the work which sustain destruction or damage be they on, near or on transit to the site. Also, the contractor shall be paid the cost of making good any such damage.

4.2.2.4 Subcontractors and Vendors. Local contracts stipulate that contractor shall not subcontract the whole of the contract. Also, the contractor may not subcontract any portion without prior written consent of the owner. The owner's consent does not relieve the contractor from any liability or obligation under the contract and he shall be liable for the acts, defaults, omissions and negligence of subcontractor(s) as fully as if they were his own. Owners have the right to reject subcontractors.

Contractor shall be liable for the delay in owner "approving" any subcontractor.

Semi-public contracts ask the contractor, in case of termination for cause due to breach by contractor, to surrender all his rights under the subcontract and the owner may deal directly with subcontractor.

Should the contractor always be liable for the actions of subcontractors and vendors? Most contracts would imply a "yes" but a deeper look into the question is required. If a subcontractor or a vendor was a sole source, i.e. the contractor was forced to do work with him, for a certain task and he caused a damage, should the contractor be liable? Or, the subcontractor or vendor was delayed due to a force majeure, should the main contractor be liable? The answer should be "no".

4.2.2.5 Accuracy of Design. Public and semi-public contracts alike shift the liability for accuracy of design package to the contractor. Following are the clauses from semi-public and public contracts respectively:

"Dimensions and locations of existing and proposed installations and appurtenances shown on the drawings are approximate only. All dimensions and locations relating to existing and proposed installations shall be checked and verified by contractor at the work site before starting the work."

"The contractor shall be responsible for the review of the engineering and technical designs in all their details. He shall report to the employer (owner) and the Engineer (owner's agent) any mistakes or remarks he

discovered in the drawings during the execution. Failure to do so does not relieve him of any of his liabilities."

This is a clear liability shifted unjustly to the contractor. There are several clauses in engineering contracts that place liability on the A/E for the accuracy of his design. Therefore, owners try, though unwisely, to disclaim liability for design errors which leads to higher bids and a breeding ground for claims.

4.2.2.6 Bill of Quantity. Unlike semi-public contracts, which ask the bidders to make their own material take-off, public contracts provide a bill of quantity detailing all quantities that in the design package. In other words, the take-off is given with the bid package.

Liability for accuracy of the bill of quantity should be on the A/E mainly because he prepared it or, as far as the contractor is concerned, on the owner. However, public owners disclaim or shift the liability on the contractor by using the following clause :

"All quantities are subject to remeasurement. The quantities given in the bill of quantities are approximate and each Tenderer (bidder) must satisfy himself regarding the general accuracy of the quantities given and shall call attention in a letter accompanying his tender to any quantities which he considered to materially differ from those given in the bill of quantities. Tenderers shall when preparing their tenders make due allowance for any such discrepancies as no adjustment will subsequently be made to the rates submitted should it be found that the actual quantities differ from those entered in the bill of quantity or schedules of prices".

4.2.2.7 Suspension/Termination of Work. One area that blends risk, uncertainty and liability is the owner's contractually enforced interruption of work. This interruption may be temporary, suspension of work, or permanent, termination of work.

Saudi public owners use only the suspension of work clause. In it, the owner reserves the right to suspend work in whole or in part. Then he states that he shall not bear the cost if reason is due to a) otherwise provided for in the contract (breach of contract), b) necessary for the proper execution of work or improvement of quality, or c) the safety of the work or any part thereof. In this clause, the owner implies that he shall bear the cost otherwise. But, with the spectrum of reasons mentioned in this clause the owner can get himself covered easily, i.e. due to the subjectivity of safety, quality, or proper execution.

The semi-public contract clause goes to more elaborate levels. Here, the owner reserves clearly his right to suspend work or any part thereof at any time, with or without cause by giving a written notice to the contractor of the effective date of suspension.

Contractor is liable to safeguard the suspended work. Also, the owner states clearly that he shall not be liable for loss of anticipated profits or for any other cost incurred with respect to suspended work during the period of suspension. However, if the suspension is without cause, the owner shall "pay reasonable, auditable and verifiable costs" which are a) incurred for safeguarding, b) personnel or equipment ordered by owner to stay on

site, and c) unavoidable cost of reassembling personnel and equipment. Also, owner reserves the right to resume suspended work at any time.

Termination clauses in semi-public contracts go into two cases. The first is termination at owner's convenience (without cause). Here, the owner may suspend all or part of the work and compensate contractor for the completed portions. Contractor will not be compensated for loss of opportunity. The second is termination for cause in which case the contractor is found in substantial breach of contract. In this case, the owner retains all payments due contractor and finishes the work with another. If the owner incurs more cost than he would have with the contractor he deducts those amounts from the retained amounts. If the retained amounts are not enough, then the contractor is liable to pay the difference within (30) days.

Semi-public contracts provide a clause in which contractor may only terminate contract for significant breach by owner. In this case, contractor would enter into a battle to prove it and into another to be compensated for the work performed.

4.2.2.8 Owner's Possession before Completion. Local contracts give the owner the right to take possession and use for any purpose, any part of the facilities (work) at any time prior to completion after notifying the contractor. Semi-public go further to stipulate that such possession or use shall not be deemed to be an acknowledgment of completion and shall not limit or waive contractor's obligations towards completion. Contractor shall be compensated if such possession affects his cost or schedule.

However, if such possession or use resulted from the contractor's inability to perform according to his approved schedule, then he shall not be compensated for neither cost nor schedule.

A question of liability is: If owner uses part of the work without acknowledging completion, then how can the contractor be liable for any damage the owner may cause as result of his use?

4.2.2.9 Standby Time. Semi-public contracts stipulate that contractor shall be compensated for standby time only for periods in which contractor's personnel or equipment are committed exclusively to the work, are ready for immediate use but cannot be used due to circumstances within the sole control of the owner. Contractor is asked to minimize standby time by rescheduling such personnel and equipment for use elsewhere.

Contractor, however, is liable to notify owner in writing as soon as he anticipates that standby time may occur but not after commencement of standby time. During standby time contractor must adhere to the time reporting procedure elsewhere in the contract. Should contractor fail to do the above, he would lose his compensation.

4.2.2.10 Liquidated Damages. Public contracts impose upon contractors liquidated damages for delay caused by contractor. These damages, depending on the period of delayed, may reach a maximum of 10% of the contract value. In addition, contractor shall bear the cost incurred by owner for supervising the work during the delayed period.

Owner does indicate any situation where he may be liable for liquidated damages to the contractor.

Semi-public contracts stipulate that neither the contractor nor the owner shall be liable to each other for consequential damages (liquidated damages) including, but not limited to loss of profit or products whether such liability is based upon any breach of either party's obligations or whether liability is based upon any negligent act or omission of either party.

4.2.2.11 Inspection by Owner. Local contracts say that contractors must always allow owner, or his agent, enough time to inspect work before covering-up. The cost and delay of uncovering uninspected work shall be borne by the contractor. Although owners have legitimate rights to inspect work before contractor covers it permanently, contracts do not stipulate or define "enough time". Owners should set a time limit for their inspection after which they will be liable for delay.

4.3 The Liability Matrix

Tables 4.1 and 4.2 show the allocation of liability for the design and construction contracts respectively. Under "Actual Contracts", the distribution of liability is given as found in actual public and semi-public contracts. Under "Sector", a "P" denotes a liability particular to the Public sector only and an "S" for Semi-public contracts only. If none is indicated, it means that the liability item is found in both. Under "Proposed" a reflection of the opinions in Part B for the party that best controls that

particular liability item and should bear it. The frequencies upon which the proposed part of the matrix is based are found in Appendix III.

4.3.1 Advantages of the Liability Matrix

This liability matrix has several advantages; following are the most significant:

1. It serves as a guide or check list for those involved in writing contracts as to the liability items to be considered.
2. It gives a guide for allocation of liability; it suggests a better allocation of liability.
3. It indicates to Public and Semi-public owners which items are not included in their contracts.

4.3.2. Results of the Proposed Matrix for Design Contracts

Following is a discussion of the major findings of Part B of the questionnaire pertaining to design contracts as reflected from table 4.1.

1. The A/E, in his capacity as a consultant, should assist the owner in completing the detailed scope of work. One way of accomplishing this is by advising the owner of items that should be added, deleted or even changed in the scope of work prepared by the owner.

2. Some respondents indicated that the A/E should provide all available information on the project, however, the majority indicated that the owner best controls this item which is not different from actual. These responses,

however, indicate that the A/E should, at least, advise the owner of missing or incomplete information and propose methods of obtaining it should the owner be unable to obtain it.

3. The owner should share the A/E the liability for selecting the most appropriate scale for drawings and to provide bench marks. This is logical since the use of scale would determine the number of drawings, which is, the basis for estimating the required man-hours and fee to complete the contract.

4. Some respondents indicated that the owner should share the liability for both technical and economic feasibility analyses. This is quite understandable since the owner is liable for the criteria upon which the analyses are based.

5. The liability for preparing the contract document should be shared. This makes sense because the owner is going to control the execution of the contract.

6. The owner should share the liability of obtaining the necessary licenses and governmental authorizations and to coordinate with the concerned agencies. Since the owners are public or semi-public, they could be in better control to reduce the beauracratic procedures to obtain licenses, authorizations and coordinate with the concerned agencies.

7. The A/E should share the owner's liability to issue and document change. This is due to the A/E's capacity as a consultant in which he is

obliged to advise the owner of necessary changes and having these changes properly documented before commencing work on such changes.

4.3.3 Results of the Proposed Matrix for Construction Contracts

1. The liability for the confidentiality of bid details is borne by the owner in actual contracts, however, respondents clearly indicated that it should be shared by both, owner and contractor. This is true, especially, after placing bids, it is common for contractors' personnel to communicate bid prices and other information.

2. The majority of respondents placed the liability of bid mistakes with the contractor; however, some indicated it should be shared. The researcher sees it is unethical for the owner to discover a mistake in the bid without clarifying it with the contractor and give him the chance to withdraw should the mistake be of significant size. Semi-public owners allow contractors to withdraw in such cases.

3. Obtaining necessary licenses and permits was placed on both rather than on contractors alone. As the case with the A/E, the owner usually would be in better position to deal with this issue. In other words, the owner should assist in obtaining such licenses and permits.

4. Third party liability is proposed to be shared. It is logical for the owner to stipulate cases in which he would bear the third party liability, instead of generally shifting it to the contractor.

5. Promotion of local manufacturers and suppliers should be a shared liability. The owner should specify articles to be brought from local manufacturers and suppliers and hence giving the same message to all contractors during the bidding period. Should such items be more expensive than similar imported items, the owner should indicate that he is willing to bear the cost difference.

6. Performing government relations activities is proposed to be a shared liability. The owners, here, are either public or semi-public, who have more resources to perform such activities. Owners should indicate what activities are expected of the contractor and those which are not.

7. The owner should be liable for failure to carry out QA/QC or inspection and testing of work. This liability should be primarily borne by the contractor, but the owner should approve the contractor's QA/QC program and make sure the contractor has qualified personnel and equipment to carry out such activities. Also, the owner's representative should inspect work to guarantee adherence to specifications. This should eliminate some potential disputes.

8. Respondents indicated that the liability for site conditions including surface and subsurfce should be shared. This indicates that there are situations in which the owner best controls this liability such investigating subsurface conditions, i.e. during the design stage. Also, there are situations where the contractor should bear this liability such as investigating surface features and correlate drawings with existing conditions before placing his bid.

9. The contractor should share the responsibility of issuing and documenting changes. This protects the contractor since he is fully liable for working on undocumented changes.

10. Semi-public contracts stipulate that neither the owner nor the contractor shall be liable to the other for liquidated or consequential damages. Public contracts do not cover this issue. Respondents indicated that both should be liable. This means that owners should stipulate fair methods of compensation due to them or due to the contractor depending on the case.

TABLE 4.1 Liability Matrix for Design Contracts

Areas of Liability	Actual Contracts			Proposed			
(Design Contract)	Owner	A/E	Sector	Owner	A/E	Both	None
Detailed scope of work	✓					✓	
Provide all available info on the project	✓			✓			
Provide applicable owner's standards	✓		S	✓			
Stipulate payment method	✓			✓			
Stipulate methods for claims and dispute settlement	✓			✓			
Complete reviews within stipulated time	✓			✓			
Access to site	✓			✓			
Perform engineering and other related design services		✓			✓		
Prepare technical specifications		✓			✓		
Select most appropriate scale for drawings		✓			✓		
Provide bench marks		✓				✓	
Obtain owner's approval on design calculations		✓			✓		
Study and verify existing conditions		✓			✓		
Investigate surface and subsurface conditions		✓			✓		
Topographic, soils and hydraulic studies (if not provided by owner)		✓			✓		
Bill of quantity (material take-off)		✓	P		✓		
Feasibility (technical and economic) analyses		✓			✓		
Advise owner of errors in contract or studies needed		✓			✓		
Prepare construction contract document		✓	P			✓	
Review and analyze bids	✓	✓	P	✓			
Estimate construction and operation cost		✓	P			✓	
Control cost and keep it within target		✓	S		✓		
Notify owner of anticipated cost deviations (design contract cost)		✓	S		✓		
Use of national products		✓				✓	
Prepare and submit for approval all work schedules		✓			✓		

TABLE 4.1 (Continued)

Areas of Liability	Actual Contracts			Proposed			
(Design Contract)	Owner	A/E	Sector	Owner	A/E	Both	None
Maintaining adequate performance rate		✓			✓		
Third party liability		✓	P			✓	
Obtain all applicable insurances		✓				✓	
Obtain necessary licenses and governmental authorizations		✓				✓	
Coordinate with all concerned agencies		✓				✓	
Adherence to laws and customs of Saudi Arabia		✓	P			✓	
Adherence to import and customs laws		✓				✓	
Sufficient offices, manpower and equipment		✓			✓		
Submitting employee resumes and qualifications for owner's approval		✓			✓		
Maintaining manpower roster		✓			✓		
Cost to remove and replace from project any person owner sees unfit		✓			✓		
Confidentiality of information		✓				✓	
Protection of owner's title to design		✓			✓		
Infringement of patents, copyrights and trade secrets		✓				✓	
Cooperation to facilitate inspection of work		✓			✓		
Design subcontractor's acts and omissions		✓			✓		
Obtain approval before subcontracting		✓			✓		
Guarantee no further subcontracting		✓			✓		
Issue and document change	✓					✓	
Liquidated damages for delay (up to 10% of contract value)		✓	P			✓	
Conflict of interest		✓				✓	
Train owner's personnel and provide offices and transportation		✓	P		✓		
Paying Zakat and income tax		✓			✓		

Legend: Cont.: Contractor; Sector: P: Public, S: Semi-public, blank: both.

TABLE 4.2 Liability Matrix for Construction Contracts

Areas of Liability	Actual Contracts			Proposed			
(Construction Contract)	Owner	Cont	Sector	Owner	Cont	Both	None
Answer clarifications during bidding period	✓			✓			
Stipulate payment method	✓			✓			
Stipulate definitions and contractual responsibilities	✓			✓			
Stipulate methods for claims and dispute settlement	✓			✓			
Confidentiality of bid details	✓					✓	
Bid mistakes		✓			✓		
Obtain necessary guarantees, insurances and bonds		✓			✓		
Obtain necessary licenses and permits		✓				✓	
Third party liability		✓				✓	
Pay Zakat, taxes and duties		✓			✓		
Sufficient quantity and skill of labor		✓			✓		
Labor housing transportation and medical treatment		✓			✓		
Maintaining labor roster at work site		✓			✓		
Availability of resources to execute work		✓			✓		
Adequacy and suitability of equipment		✓			✓		
Provide and maintain temporary structures		✓			✓		
Provide site superintendence during execution		✓			✓		
Site housekeeping and sanitary conditions		✓			✓		
Site first aid trained personnel and supplies		✓	S		✓		
Site security (including material yard)		✓			✓		
Site safety		✓			✓		
Pollution control caused by work		✓			✓		
Noise control and undue disturbance of public		✓			✓		
Unnecessary or improper interference with public convenience		✓	P		✓		
Mobilization and demobilization		✓			✓		
Dumping debris in an approved location		✓			✓		

TABLE 4.2 (Continued)

Areas of Liability	Actual Contracts			Proposed			
(Construction Contract)	Owner	Cont	Sector	Owner	Cont	Both	None
Prepare schedules (bar charts, CPM, ...) for owner's approval		✓			✓		
Maintain progress and overcome schedule slippage		✓			✓		
Notifying owner of actual or anticipated delay		✓			✓		
Promotion of local manufacturers and suppliers		✓				✓	
Utilize Saudi airline and maritime carriers		✓				✓	
Maintaining procurement records		✓			✓		
Preservation of existing structures, facilities and utilities		✓			✓		
Preserve vegetarian (other than marked for removal) on or near site		✓			✓		
Subcontractors' and suppliers' acts and omissions		✓			✓		
Obtain approval before subcontracting		✓			✓		
Guarantee no further subcontracting		✓			✓		
Obtaining SASO approval on imported material and equipment		✓				✓	
Adherence to laws and customs of Saudi Arabia		✓				✓	
Adherence to import and customs laws		✓			✓		
Perform government relations activities		✓			✓		
Giving notices and paying fines to public authorities applicable to work		✓	P		✓		
Prepare as-built drawings		✓			✓		
Prepare shop and work drawings		✓			✓		
Documenting by photographs		✓			✓		
Delayed progress payments	✓			✓			
Infringement of patents, copyrights and trade secrets		✓				✓	
Allow owner access to all aspects of work		✓			✓		
Cooperation to facilitate inspection of work		✓			✓		
QA/QC (inspection and testing of work)		✓			✓		

TABLE 4.2 (Continued)

Areas of Liability	Actual Contracts			Proposed			
(Construction Contract)	Owner	Cont	Sector	Owner	Cont	Both	None
Preserving articles of value, archaeological or geological interest		✓	P			✓	
Site conditions including surface and subsurface		✓				✓	
Safeguarding title to design, confidential information and patents		✓			✓		
Obtain owner's approval before issuing publicity releases		✓			✓		
Criminal misappropriation and misapplication		✓			✓		
Issue and document change	✓					✓	
Working on undocumented change		✓			✓		
Liquidated damages for delay (up to 10% of contract value)		✓	P		✓		
Liquidated damages (consequential damages)	No	No	S			✓	
Conflict of interest		✓				✓	
Force majeure	No	No	S			✓	
Special risks (limited to outbreak of war)	✓		P			✓	
Standby time controlled by owner	✓		S	✓			
Standby time controlled by contractor		✓	S		✓		
Maintenance period		✓			✓		
Cost of contractor's search for defects controlled by owner (implied)	✓		P	✓			
Cost of contractor's search for defects controlled by contractor		✓	P		✓		
Cooperation with other contractors working for owner in the area		✓	P		✓		
Warranty of work		✓			✓		
Guarantee for 10 years against partial or complete collapse		✓	P		✓		

Legend: Cont.: Contractor; Sector: P: Public, S: Semi-public, No: none; blank: both.

4.4 Statistical Methods

Following is a description of the statistical methods used for the analysis and interpretation of the data obtained from Part C of the survey.

1. Tabulation and Cross-Tabulation
2. Statistical Techniques
3. Correlation
4. Ranking

The obtained data sets were analyzed using the above methods. The results are shown in tabular format throughout this chapter and the Appendices IV thru VII. A description of each of these methods is as follows:

4.4.1 Tabulation and Cross-Tabulation

This method places some chosen data into a two-way tabular form in order to describe the functional relation of each data. The involvement of the respondent with the public and semi-public sectors, i.e. the number of projects he was involved in, is crossed with the party the respondent represents. The results are shown in table 4.3.

TABLE 4.3 Tabulation and Cross-Tabulation

FREQUENCY PERCENTAGE ROW PCT COLUMN PCT	OWNERS	A/Es	CONTRACTORS	TOTAL
≥ 2 projects and < 5 projects	1 1.92 50.00 10.00	0 0.00 0.00 0.00	1 1.92 50.00 2.78	2 3.84
≥ 5 projects and < 10 projects	3 5.77 42.86 30.00	1 1.92 14.28 16.67	3 5.77 42.86 8.33	7 13.46
≥ 10 projects and < 20 projects	4 7.69 23.53 40.00	3 5.77 17.64 50.00	10 19.23 58.82 27.78	17 32.69
≥ 20 projects	2 3.84 10.53 20.00	2 3.84 10.63 33.33	15 28.84 78.94 41.67	19 36.54
unclear response	0 0.00 0.00 0.00	0 0.00 0.00 0.00	7 13.46 100.00 19,44	7 13.46
TOTAL	10 19.23	6 11.54	36 69.23	52 100.00

4.2.2 Statistical Techniques

The researcher utilizes the following statistical techniques for the analysis of the obtained data. These techniques proved to be instrumental in the interpretation of such data. These techniques are described below (Al-Hazmi, 1987).

1. The Mean, $X = \sum_{h=1}^{3} W_h * \overline{X}$ (Eqn. 4.1)

   Where $W_h = n_h/n$, h = 1, 2, 3

2. The Standard Deviation, $S_X = \sqrt{\sum_{h=1}^{3} W_h^2 * S_{xh}^2}$ (Eqn. 4.2)

3. The Standard Error of Mean, $S_{\overline{X}} = S_X / \sqrt{n}$ (Eqn. 4.3)

   This is used to describe the deviation of sample means around their population mean.

4. The 95% confidence interval = $\overline{X} \pm 1.96 * S_{\overline{X}}$ (Eqn. 4.4)

5. The coefficient of variation, C.V. = $(S_x / \overline{X}) * 100\%$ (Eqn. 4.5)

Sample data is not an exact determination of the population value, however, we can estimate the interval in which this data is considered to contain the population value using a certain coefficient. The confidence coefficient used in this research is 95%. This means that 95% of the samples taken would contain the actual mean of the entire population within an interval of $\pm 1.96 * S_{\overline{X}}$. Table 4.4 shows the intervals by giving the lower limit (LL) and the upper limit (UL) for each statement.

TABLE 4.4 Statistical Results

#	Statement	Mean	Std. Dev.	Std. Err.	UL	LL	C. V.
1	Owners use the following subjective phrases in the contract language to escape / shift liability:						
a	Contractor shall exert all reasonable efforts to ...	2.25	0.467	0.065	2.377	2.123	20.77
b	... shall be, but not limited to, ...	2.19	0.516	0.072	2.333	2.052	23.56
c	Performed to a first class, workmanlike manner...	2.48	0.485	0.067	2.613	2.349	19.54
d	... or equal.	2.75	0.548	0.077	2.896	2.595	19.96
e	... performed to the satisfaction of the [owner or his agent]	2.02	0.540	0.075	2.166	1.872	26.75
f	... performed to a satisfactory level.	2.79	0.439	0.061	2.908	2.669	15.73
g	Contractor shall allow [owner or his agent] enough time to...	2.60	0.577	0.080	2.753	2.439	22.21
2	Owners should guarantee due payments to contractors by submitting a payment bond or other type of guarantee.	2.35	0.476	0.066	2.476	2.217	20.30
3	Owners should have the right to remove from work any person they see unfit and contractor must replace him at his own expense.	2.44	0.439	0.061	2.562	2.323	17.97
4	The contractor will still be liable for his compensation if he worked on change, based on good faith, without proper documentation by owner.	2.44	0.526	0.073	2.585	2.299	21.56
5	Should owner suspend or terminate contract for his convenience, then he should compensate contractor for liquidated damages or loss of opportunity.	2.04	0.525	0.073	2.181	1.896	25.76
6	Neither owner nor contractor shall be liable to the other for costs incurred by the other as result of any delay or failure to perform arising out of unforseeable happenings beyond either party's control.	2.78	0.451	0.063	2.908	2.661	16.19

TABLE 4.4 (Continued)

#	Statement	Mean	Std. Dev.	Std. Err.	UL	LL	C. V.
7	If owner decides not to award the contract after receiving the bids, then he shall compensate bidders for all or part of the cost of preparing bids.	3.38	0.415	0.059	3.495	3.265	12.27
8	Owner could reject any bid for reason or for on reason.	3.45	0.375	0.052	3.554	3.348	10.86
9	Owner can publish information about the contract (including data about contractor) without contractor's consent.	3.81	0.546	0.076	3.956	3.659	14.34
10	A serious dispute arose during the performance of the contract, the contractor will not be found liable if he suspends the contract.	2.85	0.448	0.066	2.977	2.718	15.73
11	Owner commits substantial breach of contract, then contractor should have the right to terminate contract and be compensated.	2.80	0.413	0.058	2.914	2.686	14.75
12	Design consultant shall be liable for the accuracy of his estimate of construction and operation costs.	2.60	0.465	0.064	2.723	2.470	17.91
13	Owner shall be liable if he delayed his review of design submittal beyond the stipulated period.	2.50	0.445	0.062	2.621	2.379	17.78
14	If owner delays paying the contractor then he should pay the amounts plus damages to the contractor.	2.52	0.422	0.059	2.634	2.404	16.76
15	Owner should give to the design consultant all data in his possession related to project. He should be found liable otherwise.	2.27	0.434	0.061	2.394	2.155	19.09
16	Contractor should cooperate with other contractors working for the same owner in the same area.	2.56	0.376	0.052	2.660	2.455	14.72
17	Contracts in Saudi Arabia are written in simple language.	3.06	0.280	0.040	3.137	2.983	9.14
18	Owners in Saudi Arabia try to shift liability to the contractor or design consultant (depending on the phase of the project)	2.33	0.530	0.074	2.479	2.188	22.71

TABLE 4.4 (Continued)

#	Statement	Mean	Std. Dev.	Std. Err.	UL	LL	C. V.
19	Proper sharing of risk and liability in contracts may lead to lower bids for the owner through more competition and less contingency.	2.37	0.527	0.075	2.515	2.220	22.25
20	Contractor should verify all site conditions including subsurface conditions. Owner should not be liable for accuracy of this data.	3.44	0.450	0.062	3.565	3.320	13.07
21	Contracts in Saudi Arabia should include a differing site conditions clause to shift the liability of subsurface conditions to the owner should they differ than those shown in the design package.	2.63	0.339	0.047	2.720	2.535	12.88
22	Owner should share with contractor his loss due to a steap escalation in prices.	3.10	0.425	0.059	3.215	2.982	13.70
23	Contractor should be liable for all types of weather, even severe unpredictable weather.	3.58	0.555	0.077	3.728	3.426	15.52
24	Contractor should verify quantities given in the Bill of Quantities before making his bid and make allowances for mistakes.	2.83	0.486	0.067	2.959	2.695	17.18
25	Owner should guarantee to make his inspection and review of submittals within certain time, after which, he should compensate contractor for delay.	2.29	0.453	0.063	2.418	2.170	19.74

LEGEND: Std. Dev.: Standard Deviation; Std. Err.: Standard Error; UL: Upper Limit of the 95% confidence interval; LL: Lower Limit of the 95% confidence interval; C.V.: Coefficient of Variation.

The actual mean of the entire population would be (3.00) which represents the **AGREE** response according to the scoring scale represented in figure 4.1.

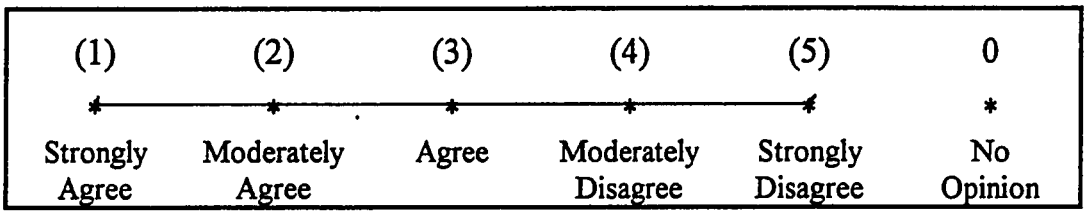

Figure 4.1 Scoring Scale

4.4.3 Correlation (r)

This method is used to find the relationship or association between the different parties and the extent of such relationship. Following is a description if three different correlation methods to describe the association among the parties of this research.

1. The Spearman correlation is used to compare how any two parties agree while completely ignoring the third. Table 4.6 shows that there is 92.4% agreement between Owners and A/Es while ignoring Contractors; 87.8% between Owners and Contractors while ignoring A/Es and 88.3% between A/Es and Contractors while ignoring Owners.

TABLE 4.5 Severity Index and Ranking

	OWNERS								A/E's								CONTRACTORS								COMPOSITE							
##	1	2	3	4	5	0	SI	R	1	2	3	4	5	0	SI	R	1	2	3	4	5	0	SI	R	1	2	3	4	5	0	SI	R
1a	1	2	7				60.00	18	3	3					87.50	1	11	10	11	2	2		68.06	7	15	15	18	2	2	0	68.75	4
1b	3	4	3				75.00	7	3	1		2			70.83	5	12	14	2	5	3		68.75	6	18	19	5	7	3	0	70.19	3
1c	5	2	3				80.00	4.5	2	3	1				79.17	2	6	8	14	4	4		55.56	20	13	13	18	4	4	0	62.98	12
1d	3	2	3	2			65.00	15.5	2	3		1			75.00	3	7	5	12	9	3		52.78	23	12	10	15	12	3	0	57.69	19
1e	7		3				85.00	1.5	1	2	1	1		1	65.00	10	15	11	4	2	4		71.53	3	23	13	8	3	4	1	73.53	2
1f	5	2	3				80.00	4.5	1	2		3			54.17	17	3	5	18	7	3		48.61	26	9	9	21	10	3	0	55.29	21
1g	3	2	5				70.00	12	3		2		1		66.67	8.5	8	9	9	4	6		56.25	19	14	11	16	4	7	0	60.10	16.5
2	2	4	2	2			65.00	15.5	1		2	2	1		41.67	21	11	13	8	3	1		70.83	4	14	17	12	7	2	0	66.35	8
3	5	4	1				85.00	1.5	2	1	2	1			66.67	8.5	4	13	11	6	2		57.64	17	11	18	14	7	2	0	63.94	10.5
4	3	3	4				72.50	9		2	1	2	1		41.67	21	11	12	4	6	3		65.28	9	14	17	9	8	4	0	63.94	10.5
5	5	2	3				80.00	4.5	2	1	3				70.83	5	14	9	9	4			72.92	2	21	12	15	4	0	0	74.04	1
6	2	2	4	1		1	63.89	17	2		3	1			62.50	12	5	5	15	10	1		52.08	24	9	7	22	12	1	1	55.39	20
7			2	3	5		17.50	31			2	2	2		25.00	29	3	5	17	7	2	2	50.00	25	3	5	21	12	9	2	40.50	27
8	2	2		3	2	1	47.22	27			4	1	1		37.50	24		4	11	19	2		36.81	29	2	6	15	23	5	1	38.73	29
9	1	1	4	2	2		42.50	28				2	4		8.33	31	2	4	7	9	14		29.86	31	3	5	11	13	20	0	29.81	31
10		2	4	2		2	50.00	25.5			2	2	1	1	30.00	28	6	9	9	8	1	3	58.33	16	6	11	15	12	2	6	53.80	24
11	1	2	2	4		1	50.00	25.5		2	2		2		41.67	21	7	5	18	3	2	1	58.57	15	8	9	22	7	4	2	55.00	22
12	3	3	3	1			70.00	12		1	1	4			37.50	24	8	4	20	4			61.11	13	11	8	24	9	0	0	60.10	16.5
13		2	7	1			52.50	23	1	2	1	2			58.33	14	10	4	21	1			65.97	8	11	8	29	4	0	0	62.50	13
14	1	1	8				57.50	20		3	1	2			54.17	17	9	5	20	2			64.58	11	10	9	29	4	0	0	62.02	14
15	3	1	6				67.50	14		4		2			58.33	14	9	11	14	1		1	70.00	5	12	16	20	3	0	1	68.14	5
16	2	5	3				72.50	9	2	1	3				70.83	5	4	5	24	2	1		56.25	19	8	11	30	2	1	0	61.06	15
17	2	1	5	2			57.50	20			3	1	1	1	35.00	25		7	21	4	3	1	47.86	27	2	8	29	7	4	2	48.50	25
18	5	2	3				80.00	4.5	1	2	2			1	70.00	7	8	3	24	1			62.50	12	14	7	29	1	0	1	66.67	7
19	4	1	5				72.50	9	1	1	3	1			58.33	14	9	4	18	2		3	65.15	10	14	6	26	3	0	3	65.82	9
20	3	1	2	2	2		52.50	23			2	4			33.33	27	1	2	18	6	9		36.11	30	4	3	22	12	11	0	38.94	28
21	1		8	1			52.50	23	1	2	2	1			62.50	12	4	9	20	2		1	60.71	14	6	11	30	4	0	1	59.31	18
22			1	5	3	1	19.44	30	1	1	1	3			50.00	19	6	3	21	3	3		54.17	21	7	4	23	11	6	1	47.55	26
23		1	3	1	5		25.00	29				3	3		12.50	30	2	8	11	7	8		42.36	28	2	9	14	11	16	0	35.58	30
24	4	4			2		70.00	12		1	2	1	2		33.33	27	6	2	22	3	3		53.47	22	10	7	24	4	7	0	54.33	23
25		4	5	1			57.50	20		1	4	1			50.00	19	12	9	14			1	73.57	1	12	14	23	2	0	1	67.65	6

LEGEND: 1: Strongly Agree; 2: Moderately Agree; 3: Agree; 4: Moderately Disagree; 5: Strongly Disagree
0: No Opinion; SI: Severity Index; and R: Rank.

TABLE 4.6 Spearman Rank Correlation

#	RANKING BY RESPONDENT			DIFFERENCES					
	Owner	A/E	Contractor	Owner and A/E		Owner and Contractor		A/E and Contractor	
	(1)	(2)	(3)	d_{12}	d^2_{12}	d_{13}	d^2_{13}	d_{23}	d^2_{23}
1a	18	1	7	17	289	11	121	6	36
1b	7	5	6	2	4	1	1	1	1
1c	4.5	2	20	2.5	6.25	15.5	240.25	18	324
1d	15.5	3	23	12.5	156.25	7.5	56.25	20	400
1e	1.5	10	3	8.5	72.25	1.5	2.25	7	49
1f	4.5	16.5	26	12	144	21.5	462.25	9.5	90.25
1g	12	8.5	18.5	3.5	12.25	6.5	42.25	10	100
2	15.5	21	4	5.5	30.25	11.5	132.25	17	289
3	1.5	8.5	17	7	49	15.5	240.25	8.5	72.25
4	9	21	9	12	144	0	0	12	144
5	4.5	5	2	0.5	0.25	2.5	6.25	3	9
6	17	11.5	24	5.5	30.25	7	49	12.5	156.25
7	31	29	25	2	4	6	36	4	16
8	27	23.5	29	3.5	12.25	2	4	5.5	30.25
9	28	31	31	3	9	3	9	0	0
10	25.5	28	16	2.5	6.25	9.5	90.25	12	144
11	25.5	21	15	4.5	20.25	10.5	110.25	6	36
12	12	23.5	13	11.5	132.25	1	1	10.5	110.25
13	23	14	8	9	81	15	225	6	36
14	20	16.5	11	3.5	12.25	9	81	5.5	30.25
15	14	14	5	0	0	9	81	9	81
16	9	5	18.5	4	16	9.5	90.25	13.5	182.25
17	20	25	27	5	25	7	49	2	4
18	4.5	7	12	2.5	6.25	7.5	56.25	5	25
19	9	14	10	5	25	1	1	4	16
20	23	26.5	30	3.5	12.25	7	49	3.5	12.25
21	23	11.5	14	11.5	132.25	9	81	2.5	6.25
22	30	18.5	21	11.5	132.25	9	81	2.5	6.25
23	29	30	28	1	1	1	1	2	4
24	12	26.5	22	14.5	210.25	10	100	4.5	20.25
25	20	18.5	1	1.5	2.25	19	361	17.5	306.25
Σd^2					1777.5		2860		2737
$6\Sigma d^2/(n^3-n)$					0.075877		0.122087		0.116836
r_s					0.924123		0.877913		0.883164

where $r_s = 1-6\Sigma d^2/(n^3-n)$

The following agreement levels are observed :

92% between Owners and A/E's; 87.8% between Owners and Contractors; and 88.3% between A/E's and Contractors.

2. The Partial correlation is used to compare how well any two parties agree while holding the third constant. Following is a calculation of such partial correlation (Al-Hazmi, 1987):

$r_{12.3}$ = the agreement between owners and A/Es while holding contractors constant.

$$= \frac{r_{12} - r_{13} * r_{23}}{\sqrt{(1-r_{13}^2)(1-r_{23}^2)}} \qquad \text{(Eqn. 4.6)}$$

$= 0.6621$

$r_{13.2}$ = the agreement between owners and contractors while holding A/Es constant.

$$= \frac{r_{13} - r_{23} * r_{12}}{\sqrt{(1-r_{23}^2)(1-r_{12}^2)}} \qquad \text{(Eqn. 4.7)}$$

$= 0.3443$

$r_{23.1}$ = the agreement between A/Es and contractors while holding owners constant.

$$= \frac{r_{23} - r_{12} * r_{13}}{\sqrt{(1-r_{12}^2)(1-r_{13}^2)}} \qquad \text{(Eqn. 4.8)}$$

$= 0.3933$

3. The Multiple correlation is used to describe the extent of agreement between parties when considering one main party with the others. Following is the calculation of such multiple correlation:

$r_{1.23}$ = the agreement between owners and the other two parties

$$= \sqrt{\frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1-r_{23}^2}} \qquad \text{(Eqn. 4.9)}$$

$= 0.9333$

$r_{2.13}$ = the agreement between A/Es and the other two parties

$$= \sqrt{\frac{r_{12}^2 + r_{23}^2 - 2r_{12}r_{13}r_{23}}{1-r_{13}^2}} \qquad \text{(Eqn. 4.10)}$$

$= 0.9363$

$r_{3.12}$ = the agreement between contractors and the other two parties

$$= \sqrt{\frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1 - r_{23}^2}} \qquad \text{(Eqn. 4.11)}$$

$= 0.8981$

The results of the different correlation are shown in table 4.7.

TABLE 4.7 Rank Correlation Values

Spearman	Partial	Multiple
$r_{12} = 0.9241$	$r_{12.3} = 0.6621$	$r_{1.23} = 0.9333$
$r_{13} = 0.8779$	$r_{13.2} = 0.3443$	$r_{2.13} = 0.9363$
$r_{23} = 0.8832$	$r_{23.1} = 0.3933$	$r_{3.12} = 0.8981$

4.4.4 Ranking

The use of Severity Index, as described in Chapter 3, simplifies data and unifies data into a standard range, i.e. 0 - 100. This is advantageous when relative comparisons are involved.

The following four tables rank the statements of Part C in order of its severity. Tables of Appendices IV thru VII show the severity ranking of the owners stratum, the A/E's stratum, the contractors stratum and the composite responses respectively.

4.5 Statistical Results

The main statistical results are summarized as follows:

4.5.1 Coefficient of Variation

It is a relative measure of the average spread or dispersion around the mean to the mean. In this study, most of the coefficients of variation fall in

the range of 12 - 22%. Since the coefficient of variation is an indication of the homogeneity of data, the results of this research are considered to be relatively homogeneous.

4.5.2. Correlation

The correlation measures used in this study reveal that the three different strata are very close in their opinions on the issues demonstrated here. This is due to the high degree of experience and professionality of the sample. Owner representatives were highly trained and experienced project engineers. Contractors and A/Es were also highly experienced mainly because they were directly involved with the public and semi-public sectors who, unlike private sector, follow standards in executing work and whose contracts and designs are very involved.

The agreement between owners and A/Es while holding contractors constant is highest ($r_{12.3} = 0.6621$). The agreement between owners and contractors while holding A/Es constant is ($r_{13.2} = 0.3443$) and the

agreement between A/Es and contractors while holding owners constant ($r_{23.1} = 0.3933$). This proves that owners responses are very important.

Multiple correlation are very close and; hence, emphasize the agreement between the parties on the issues presented. It also emphasize the knowledge of the parties of the liability issues and their objectivity in answering or indicating their level of agreement to each statement.

4.5.3. Cross-Tabulation

The following can be deduced from the data presented in table 4.3.

a. 4% of the respondents have an experience in Saudi Arabia of less than 5 projects.

b. 13% have experience between 5 - 9 projects.

c. 33% have experience between 10 - 19 projects.

d. 37% have experience of more than 20 projects.

e. 13% showed unclear responses on the actual project involvement question and were grouped together. As an example, one responded by "more than I care to count".

The above shows that respondents had significant level of expertise and this is due to 1) dealing with the highest level of experience and professionalism in the local construction industry; and 2) the use of quota sampling in which the respondents were chosen and responses that failed the requirement of section 3.2 were not considered and were replaced with responses that were qualified.

4.5.4. Test of Hypothesis

The "t-test" is utilized to test the hypothesis that owners, A/Es and contractors agree on the severity ranking of the statements of Part C of the questionnaire. It is intended here to test the correlation by testing the agreement between the strata. The null hypothesis is tested by comparing the values of "t" calculated for the three types of correlation with the critical test value.

The null hypothesis $H_o : r = 0$

This hypothesis states that the strata do not agree on the severity ranking of the statements of Part C; therefore, there is no correlation among them, i.e. ($r = 0$).

To calculate the values of "t" (Al-Hazmi, 1987):

$$t = \sqrt{\frac{r^2(n-2)}{1-r^2}} \qquad \text{(Eqn. 4.12)}$$

where: r = the correlations presented in table 4.6.

n = the number of observations or statements in the study (n=31).

Table 4.8 presents the "t" values.

TABLE 4.8 t-Test Values

$t_{12} = 13.02$	$t_{12.3} = 4.76$	$t_{1.23} = 13.99$
$t_{13} = 9.87$	$t_{13.2} = 1.97$	$t_{2.13} = 14.36$
$t_{23} = 10.14$	$t_{23.1} = 2.30$	$t_{3.12} = 11.00$

The critical test value (Al-Hazmi, 1987):

$t_{0.05,\infty} = 1.645$ (Eqn. 4.13)

Comparison of the "t" values of table 4.8 with the critical test value reveals that all values are greater than the critical test value. This rejects the null hypothesis; and hence, the owners, A/E's and contractors agree on the severity ranking of Part C.

4.6 Major Findings

Following is a discussion of the major findings of Part C of this research.

4.6.1 Liabilities Applicable to Both Contracts

The following areas of liability are not unique to construction contracts but may be applicable to design contracts as well. Therefore, when considering these liabilities, the reader should think of the contractor as both the design contractor and the construction contractor.

4.6.1.1 Contract Language. Three statements were directed toward testing owners' use of exculpatory language in contracts to evade liability. Statement # 1 asked respondents to indicate their level of agreement with the allegation that owners use the given subjective phrases to escape or shift liability. Statements # 17 and 18 used a more direct approach. Here, statement # 17 stated that local contracts are written in simple language, whereas statement # 18 states that owners in Saudi Arabia try to shift liability to contractors.

Respondents agree that owners use subjective phrases to shift or escape liability. Ironically, owners and A/Es had higher severity index on all phrases than contractors. As for statement # 17, a "mild" disagreement (I_s = 48.5) was concluded; hence, contracts are not written in simple language. Ironically, also, most of the contractor respondents agreed that contracts are written in simple language. For statement # 18, it was agreed that owners try to shift liability to the consultant or the contractor depending on the phase of the project. The highest severity index was for the contractors (80.00). From the outcome of these statements, it is very

obvious that owner respondents are very objective; and hence, the element of owner bias can be ruled out.

4.6.1.2 Progress Payments. Two statements test owners' liability on the issue of progress payments. Statement # 2 states that owners should guarantee due payments to contractors by submitting a payment bond or other type of guarantee. Statement # 14 says that owners should pay amounts plus damages to the contractor should they delay paying due progress payments.

Owners and contractors moderately agree on statement # 2 but A/Es disagree. Respondents agree to statement # 14; therefore, owners should submit a guarantee or payment bond to guaranty due payments and owners should pay damages in addition to due payments in case of progress payment delay. This is only fair since owners ask for guarantee for performance and impose damages or fines on contractors if they delay completion. Also, these statements prove that owners understand that their delay of progress payments will almost certainly create cash flow problems for the contractor.

4.6.1.3 Suspension or Termination of Work by Contractor.

Statements # 10 and 11 test if contractor could suspend work in case of a serious dispute or even terminate work should the owner commit a substantial breach of contract.

Owners just agree to both statements, A/E's moderately disagree to both and contractors agree to both. Compositely a "mild" agreement to both.

Owners give themselves the right to suspend or terminate contracts even for convenience; i.e. without cause or fault of contractor, but they do not give a similar right to contractors, leaving them at a disadvantage. Responses to the above statements suggest that owners should stipulate similar rights in cases where serious disputes or breaches of contract occur. Also, answers to both statements prove consistency of respondents since the gave similar responses to both statements.

4.6.1.4 Suspension or Termination by Owner. According to responses of statement # 5, respondents strongly agree, with a composite rank of 1, that owners should compensate contractors for liquidated damages or loss of opportunity should they, owners, decide to suspend or terminate contract for convenience.

Also here, owners show higher severity index than contractors. This is a reflection of awareness of owners to the one-sidedness of contracts and the necessity to change the way contracts are being written.

4.6.2.5 Timeliness of Owners' Reviews. This area of liability was tested by two statements the first, # 13, stating that an owner should compensate the A/E if he delays submitting his review of design beyond the stipulated period; and the second, # 25, which states that the owner should guaranty making his inspection and review of submittals within certain time after which he should compensate contractor for delay.

Owners agree on both and so do A/Es; however, contractors show the highest agreement on statement # 25; i.e. rank 1. This means that owners

should assume liability for delaying their reviews or inspection beyond a given period.

4.6.1.6 Undocumented Change. According to responses to statement # 4, contractors may be found liable for their compensation if they work on changes, based on good faith, without proper documentation by owner.

Owners and contractors showed a moderate agreement to this statement and A/Es disagreed. Nevertheless, the composite response was in agreement.

4.6.1.7 Force Majeure. Statement # 6 states that neither owner nor contractor shall be liable to the other as result of any delay or failure to perform arising out of unforeseeable happenings beyond either party's control.

Respondents agree to the above statement. Therefore, this statement should be provided for in contacts, especially public contracts where

unforeseeable happenings are limited to the outbreak of war, or otherwise known as the "special risks clause".

4.6.1.8 Removal of Unfit Persons. An owner should have the right to remove from work any person he sees unfit and the contractor must replace him at his own expense; so stated statement # 3.

Owners strongly agree (rank 1) and A/Es and contractors agree rather moderately. Therefore, it shall be accepted as a liability borne by contractors.

The reason this liability does not pose a great risk on contractors may be the high level of professionalism of owners' representatives.

4.6.1.9 Information Releases by Owner. Statement # 9 tests the owners right to publish information about the contract, including data about the contractor, without contractor's consent. Owners moderately disagree while A/Es and contractors strongly disagree; both ranking this statement last.

Therefore, owners should amend their clauses prohibiting contractors from issuing information releases without owners' consent to include a paragraph where they reflect the same upon themselves should they release information about contract and contractor without his consent.

4.6.2 Liabilities Unique to Construction Contracts

4.6.2.1 Owner's Rejection of Bid. Owners strongly disagree to statement # 7, A/Es moderately agree and contractors showed different responses but cumulatively "barely" agree that owners should compensate contractors for all or part of cost to prepare bids should they elect not to award the contract after receiving bids. Compositely, the respondents disagree to this statement. Also, respondents disagree to statement # 8 that an owner could reject any bid for reason or for no reason.

4.6.2.2 Verification of Site Conditions. Statements # 20 and 21 deal with contractors liability to verify site surface and subsurface conditions. The first places the liability on the contractor, as it is the case with actual

local contracts; whereas the second suggests that owners should include a "differing site conditions clause" in contracts to shift the liability of surface and subsurface conditions back to them.

Owners response was deemed contradictory, since they agreed to both opposing statements. On the other hand, A/Es and contractors moderately disagree on the first and agree on the second.

Therefore, owners should include a differing site conditions clause in contracts to shift the liability for surface and subsurface conditions back to them should it be found different than those shown on drawings.

4.6.2.3 Contractor Verification of Quantities. Statement # 24 places the liability for verifying quantities in the Bill of Quantities on the contractor before he places his bid. It even asks contractors to make allowances for mistakes should they be able to find any.

Owners show moderate agreement whereas A/Es show moderate disagreement. The surprising result, However, is the contractors, agreement with this statement.

4.6.2.4 Weather. Responses to statement # 23 strongly agree that contractors should not be responsible for all types of weather, including severe unpredictable weather. It is worth noting that owners and A/Es responses were stronger in disagreement than those of contractors.

4.6.2.5 Price Escalation. Statement # 22 states that an owner should share the contractor's loss due to steep escalation in prices. While owners strongly disagree, A/Es and contractors showed a severity index of just agree. The researcher concludes that this liability area does not constitute an area of concern to contractors. This may be due to the relative stability in construction material prices in the local industry.

4.6.3 Liabilities Unique to Design Contracts

Statement # 12 places the liability on the A/E for the accuracy of his estimate of construction and operation cost. A/Es moderately disagree, whereas owners and contractors agree. The A/Es disagreement may be due to their concern that their estimate is based upon data given by the owner, and that data may be incomplete or even erroneous. Should this be their concern, then they should be found liable because they can either verify the estimate basis or, if not possible to verify, mention that estimate is based upon such and such data.

The second statement that is unique to A/Es is statement # 15. Here, liability is borne by the owner should he fail to give the A/E all the data in his possession related to the project. All respondents agree, but ironically owners and contractors agree stronger than A/Es.

The researcher has some limitation on this liability. Here, the A/E must act as a consultant and advise the owner should he fail to provide some data he may deem irrelevant.

4.6.4 Sharing of Risk and Liability

Statement # 19 was the theme of this research, that is, proper sharing of risk and liability in contracts may lead to lower bids to the owner through more competition and less contingency. Owners moderately agree and A/Es and contractors agree. This is encouraging especially since the highest agreement was by owners. This indicates that liability sharing is going to improve in contracts in Saudi Arabia.

4.7 Summary

This chapter presented the results and conclusions obtained from the drawn liability matrix generated from local contracts and responses to Part B of the questionnaire. Also, it presented the statistical analysis and results of Part C and drew conclusions accordingly.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 General

This chapter summarizes the work presented by this thesis, draws conclusions based on the findings and results and, finally, gives recommendations for further research.

5.2 Summary

Chapter 1 introduced this work by giving introductory statements to the issue at hand, i.e. liability in construction. It also discussed the significance of this study, its objectives and its scope and limitations.

Chapter 2 discussed, in detail, the various areas of construction liability as found in literature. The researcher, here, chose the areas of concern to the local construction industry. Also, the researcher tried to present all views, even controversial views, without making judgments at this stage.

Chapter 3 demonstrated the means for surveying the local construction industry to solicit their opinions on various issues as delineated in the survey questionnaire.

Chapter 4 included the presentation of the liability matrix drawn from actual contracts and comparison to the matrix drawn from the various

responses of the respondents. Also, statistical analysis and interpretation of Part C of the questionnaire was discussed in detail.

The hypothesis of the agreement for the ranking of statements was tested and it was proven that the various parties, i.e. Owners, A/Es and Contractors, are in general agreement with regards to the ranking of severity of Part C.

5.3 Conclusion

This section presents the outcome of the research in brief. First is a presentation of the outcome of Part B followed by Part C.

5.3.1 Conclusions from the Liability Matrix

The following are from the matrix for the design contract:

1) Liabilities borne by owner but proposed to be shared

- Detailed scope of work
- Stipulate payment method
- Issue and document change

2) Liabilities borne by A/E but proposed to shared

- Select most appropriate scale for drawings
- Provide bench marks
- Prepare construction contract document
- Estimate construction cost
- Use of national products
- Third party liability
- Obtain all applicable insurances
- Obtain necessary licenses and governmental authorizations
- Coordinate with concerned agencies
- Adherence to laws and customs of Saudi Arabia
- Adherence to import and customs laws
- Confidentiality of information
- Infringement of patent, copyrights and trade secrets owned by others
- Liquidated damages for delay
- Conflict of interest

3) Liabilities controlled by owner and proposed to be shifted to A/E

- None

4) Liabilities controlled by A/E and proposed to be shifted to owner

- None

The following are from the matrix for the construction contract:

1) Liabilities borne by owner but proposed to be shared

- Confidentiality of bid detail
- Special risks (limited to outbreak of war)
- Issue and document change

2) Liabilities borne by contractor but proposed to shared

- Obtain necessary licenses and permits
- Third party liability
- Adherence to laws and customs of Saudi Arabia
- Adherence to import and customs laws
- Infringement of patent, copyrights and trade secrets owned by others
- Conflict of interest
- Promotion of local manufacturers and suppliers
- Utilize Saudi airline and maritime carriers
- Obtaining SASO approval on imported material and equipment
- Perform government relations activities
- QA/QC (inspection and testing of work)

3) Liabilities controlled by owner and proposed to be shifted to contractor

- None

4) Liabilities controlled by contractor and proposed to be shifted to owner

- None

5) Liabilities not controlled but proposed to be shared

- Liquidated damages (consequential damages)
- Force majeure

5.3.2 Conclusions from Part C

1) Conclusions applicable to both contracts (contractor refers to design contractor and construction contractor)

- Owners in Saudi Arabia use exculpatory language to escape or shift liability. Refraining from such practice shall produce clearer contracts; a giant step towards proper liability allocation.
- Owners should submit a guarantee or payment bond to contractors to guaranty paying progress payments on time.

- Owners should stipulate a clause giving contractors the right to suspend or terminate contracts in case of serious disputes or substantial breach of contract by owner.

- Owners should compensate contractors for liquidated damages or loss of opportunity should they decide to suspend or terminate contract for convenience.

- Owners should compensate contractors when they delay reviews beyond a stipulated period.

- Contractors are to bear the risk of losing all or part of their compensation on a particular change if they work on it without proper documentation.

- Neither owner nor contractor shall be liable to the other as result of any delay or failure to perform arising out of unforeseeable happenings beyond either party's control.

- Owners right to remove from work any person they deem unfit at contractors' expense remains unchanged.

- Owners should include a clause to prohibit them from issuing publicity releases about contract or contractor without contractor's consent.

2) Conclusions unique to construction contracts

- Owners right to abandon awarding a contract without compensating contractors for all or part of costs incurred while preparing bids remains as is.

- Owners should relinquish their right to reject any bid specially for no reason.

- Owners should include a "differing site conditions clause" in their contracts to shift liability for surface and subsurface conditions back to them should it be found different than those shown in drawings.

- Contractor's liability to verify quantities given in the Bill of Quantity and make allowances should he be able to find mistakes remains unchanged.

- Contractors should clearly stipulate that contractors should not be liable for all kinds of weather, especially, severe unpredictable weather.

- The suggestion that owners should share steep price escalation with contractors was turned down.

3) Conclusions unique to design contracts

- A/E are to be responsible for the accuracy of their estimates provided that the owners do not withhold any necessary information required to make better estimates.
- The owner should bear the liability if he fails to give the A/E all the data in his possession related to the project.

Proper sharing of risk and liability in contracts may lead to lower bids through more competition and less contingency.

5.4 Future Research

Should this research be considered as the basis for future research, then the following should be considered.

- Studying the relation between number and type of disputes and improper liability allocation.
- Quantifying or estimating the reduction in bid contingency when liabilities are properly allocated.

- Quantifying impacts of improper liability allocation on cost and schedule.

APPENDIX I

QUESTIONNAIRE

0714

بسم الله الرحمن الرحيم

92

Ministry of Higher Education

King Fahd University of Petroleum & Minerals

COLLEGE OF ENVIRONMENTAL DESIGN

Construction Engineering & Management Program

وزارة التعليم العالي

جامعة الملك فهد للبترول و المعادن

كلية تصاميم البيئة

برنامج هندسة وإدارة التشييد

No._____

Dear Sir,

Mr. Maher T. Al-Barghouthi is currently engaged in the study of liability in fixed-price construction contracts in Saudi Arabia. This study is part of his Master thesis.

In order to achieve the goals of this study, the attached questionnaire should be answered by a person acquiring an experience in the local construction practices and contractual aspects. Results shall be analyzed statistically and your completed questionnaire shall remain confidential. Please fill in your name and address if you like to receive a copy of the outcome of this study.

Your cooperation in answering this questionnaire will be highly appreciated. Please return the completed questionnaire to the address shown below.

Address : Maher T. Al-Barghouthi
P. O. Box 9227
Dhahran, 31311
Saudi Arabia

Sincerely;

Dr. Sa'di Assaf, Ph.D.

الظهران ٣١٢٦١ • المملكة العربية السعودية • تلفون : ٨٦٠-٣٥٩٠ (٠٣) • فاكس : ٨٦٠-٤٤٥٣ (٠٣) • تلكس : ٨٠١٩٥٠ جافهد • برقياً : الجامعة

DHAHRAN 31261, SAUDI ARABIA • Telephone : (03) 860-3590 • Fax : (03) 860-4453 • Telex : 801060 KFUPM SJ • Cable : AL-JAMAAH

PART A (Designer/ Consultant)

I: Please answer the following about your firm:

a) Annual engineering/design man-hours:

1) less than 20,000	[ ]
2) 20,000 - 49,999	[ ]
3) 50,000 - 99,999	[ ]
4) more than 100,000	[ ]

b) Size of staff:

1) less than 20	[ ]
2) 20 - 39	[ ]
3) 40 - 59	[ ]
4) 60 - 99	[ ]
5) more than 100	[ ]

c) Your firm obtains work at the shown proportions from the various sectors in Saudi Arabia:

1) Public	_____%
2) Semi-public	_____%
3) Private	_____%
4) other, specify_____	_____%
Total	100%

II: The number of projects for the Saudi Public and Semi-public sectors you have been involved in is _____ .

III: Your job title is _____ .

PART A (Owner)

You are kindly requested to answer the following questions:

I: Please indicate the type of owner you present:

1) Public (i.e. Government agency) [ ]
2) Semi-public (i.e. Saudi Aramco, SCECO,...etc.) [ ]
3) Other, please specify_____ . [ ]

II: The number of construction contracts you have been involved in with the local construction industry is _____ .

III: The number local construction contracts you have been invloved in preparing is _____ .

IV: Your job title is _____ .

PART A (Contractor)

I: Please answer the following about your company:

a) Indicate your company's specialty(s) and circle class according to the Ministry of Public Works and Housing classification:

1) Buildings	[ ]	class 1 2 3 4
2) Roads	[ ]	class 1 2 3 4
3) Water and sewage	[ ]	class 1 2 3 4
4) Electrical	[ ]	class 1 2 3 4
5) Mechanical	[ ]	class 1 2 3 4
6) Industrial	[ ]	class 1 2 3 4
7) Marine	[ ]	class 1 2 3 4
8) Dams	[ ]	class 1 2 3 4

b) Average size of work force:

1) less than 100	[ ]
2) 100 - 249	[ ]
3) 250 - 499	[ ]
4) 500 - 999	[ ]
5) more than 1000	[ ]

c) Your firm's annual construction volume in million Saudi Riyals:

1) less than 30	[ ]
2) 30 - 99	[ ]
3) 100 - 500	[ ]
4) more than 500	[ ]

d) Your firm obtains work at the shown proportions from the various sectors in Saudi Arabia:

1) Public	____ %
2) Semi-public	____ %
3) Private	____ %
4) Other, specify_____	____ %
Total	100 %

II: The number of construction projects for the Saudi Public and Semi- Public sectors you have been involved in is _____ .

III: Your job title is _____ .

PART B

Please allocate liability to the party that best controls it. Indicate your own opinion, which may differ from the way liability is being allocated.

Areas of Liability (Design Contract)	Owner	A/E*	Both	None
Detailed scope of work				
Provide all available info on the project				
Provide applicable owner's standards				
Stipulate payment method				
Stipulate methods for claims and dispute settlement				
Complete reviews within stipulated time				
Access to site				
Perform engineering and other related design services				
Prepare technical specifications				
Select most appropriate scale for drawings				
Provide bench marks				
Obtain owner's approval on design calculations				
Study and verify existing conditions				
Investigate surface and subsurface conditions				
Topographic, soils and hydraulic studies (if not provided by owner)				
Bill of quantity (material take-off)				
Feasibility (technical and economic) analyses				
Advise owner of errors in contract or studies needed				
Prepare construction contract document				
Review and analyze bids				
Estimate construction and operation cost				
Control cost and keep it within target				
Notify owner of anticipated cost deviations (design contract cost)				
Use of national products				

*A/E: Design firm or Engineering Consultant

(Design Contract)	Owner	A/E	Both	None
Prepare and submit for approval all work schedules				
Maintaining adequate performance rate				
Third party liability				
Obtain all applicable insurances				
Obtain necessary licenses and governmental authorizations				
Coordinate with all concerned agencies				
Adherence to laws and customs of Saudi Arabia				
Adherence to import and customs laws				
Sufficient offices, manpower and equipment				
Submitting employee resumes and qualifications for owner's approval				
Maintaining manpower roster				
Cost to remove and replace from project any person owner sees unfit				
Confidentiality of information				
Protection of owner's title to design				
Infringement of patents, copyrights and trade secrets				
Cooperation to facilitate inspection of work				
Design subcontractor's acts and omissions				
Obtain approval before subcontracting				
Guarantee no further subcontracting				
Issue and document change				
Liquidated damages for delay (up to 10% of contract value)				
Conflict of interest				
Train owner's personnel and provide offices and transportation				
Paying Zakat and income tax				

Areas of Liability (Construction Contract)	Owner	Con-tractor	Both	None
Answer clarifications during bidding period				
Stipulate payment method				
Stipulate definitions and contractual responsibilities				
Stipulate methods for claims and dispute settlement				
Confidentiality of bid details				
Bid mistakes				
Obtain necessary guarantees, insurances and bonds				
Obtain necessary licenses and permits				
Third party liability				
Pay Zakat, taxes and duties				
Sufficient quantity and skill of labor				
Labor housing transportation and medical treatment				
Maintaining labor roster at work site				
Availability of resources to execute work				
Adequacy and suitability of equipment				
Provide and maintain temporary structures				
Provide site superintendence during execution				
Site housekeeping and sanitary conditions				
Site first aid trained personnel and supplies				
Site security (including material yard)				
Site safety				
Pollution control caused by work				
Noise control and undue disturbance of public				
Unnecessary or improper interference with public convenience				
Mobilization and demobilization				
Dumping debris in an approved location				

Areas of Liability (Construction Contract)	Owner	Con-tractor	Both	None
Prepare schedules (bar charts, CPM, ...) for owner's approval				
Maintain progress and overcome schedule slippage				
Notifying owner of actual or anticipated delay				
Promotion of local manufacturers and suppliers				
Utilize Saudi airline and maritime carriers				
Maintaining procurement records				
Preservation of existing structures, facilities and utilities				
Preserve vegetarian (other than marked for removal) on or near site				
Subcontractors' and suppliers' acts and omissions				
Obtain approval before subcontracting				
Guarantee no further subcontracting				
Obtaining SASO approval on imported material and equipment				
Adherence to laws and customs of Saudi Arabia				
Adherence to import and customs laws				
Perform government relations activities				
Giving notices and paying fines to public authorities applicable to work				
Prepare as-built drawings				
Prepare shop and work drawings				
Documenting by photographs				
Delayed progress payments				
Infringement of patents, copyrights and trade secrets				
Allow owner access to all aspects of work				
Cooperation to facilitate inspection of work				
QA/QC (inspection and testing of work)				

Areas of Liability (Construction Contract)	Owner	Con-tractor	Both	None
Preserving articles of value, archaeological or geological interest				
Site conditions including surface and subsurface				
Safeguarding title to design, confidential information and patents				
Obtain owner's approval before issuing publicity releases				
Criminal misappropriation and misapplication				
Issue and document change				
Working on undocumented change				
Liquidated damages for delay (up to 10% of contract value)				
Liquidated damages (consequential damages)				
Conflict of interest				
Force majeure				
Special risks (limited to outbreak of war)				
Standby time controlled by owner				
Standby time controlled by contractor				
Maintenance period				
Cost of contractor's search for defects controlled by owner (implied)				
Cost of contractor's search for defects controlled by contractor				
Cooperation with other contractors working for owner in the area				
Warranty of work				
Guarantee for 10 years against partial or complete collapse				

PART C

Please indicate your level of agreement with the following statements:

#	Statement	Strongly Agree	Moderately Agree	Agree	Moderately Disagree	Strongly Disagree	No Opinion
1	Owners use the following subjective phrases in the contract language to escape / shift liability:						
a	Contractor shall exert all reasonable efforts to ...						
b	... shall be, but not limited to, ...						
c	Performed to a first class, workmanlike manner...						
d	... or equal.						
e	... performed to the satisfaction of the [owner or his agent]						
f	... performed to a satisfactory level.						
g	Contractor shall allow [owner or his agent] enough time to...						
2	Owners should guarantee due payments to contractors by submitting a payment bond or other type of guarantee.						
3	Owners should have the right to remove from work any person they see unfit and contractor must replace him at his own expense.						
4	The contractor will still be liable for his compensation if he worked on change, based on good faith, without proper documentation by owner.						
5	Should owner suspend or terminate contract for his convenience, then he should compensate contractor for liquidated damages or loss of opportunity.						
6	Neither owner nor contractor shall be liable to the other for costs incurred by the other as result of any delay or failure to perform arising out of unforseeable happenings beyond either party's control.						
7	If owner decides not to award the contract after receiving the bids, then he shall compensate bidders for all or part of the cost of preparing bids.						
8	Owner could reject any bid for reason or for no reason.						
9	Owner can publish information about the contract (including data about contractor) without contractor's consent.						
10	A serious dispute arose during the performance of the contract, the contractor will not be found liable if he suspends the contract.						

#	Statement	Strongly Agree	Moderately Agree	Agree	Moderately Disagree	Strongly Disagree	No Opinion
11	Owner commits substantial breach of contract, then contractor should have the right to terminate contract and be compensated.						
12	Design consultant shall be liable for the accuracy of his estimate of construction and operation costs.						
13	Owner shall be liable if he delayed his review of design submittal beyond the stipulated period.						
14	If owner delays paying the contractor then he should pay the amounts plus damages to the contractor.						
15	Owner should give to the design consultant all data in his possession related to project. He should be found liable otherwise.						
16	Contractor should cooperate with other contractors working for the same owner in the same area.						
17	Contracts in Saudi Arabia are written in simple language.						
18	Owners in Saudi Arabia try to shift liability to the contractor or design consultant (depending on the phase of the project)						
19	Proper sharing of risk and liability in contracts may lead to lower bids for the owner through more competition and less contingency.						
20	Contractor should verify all site conditions including subsurface conditions. Owner should not be liable for accuracy of this data.						
21	Contracts in Saudi Arabia should include a differing site conditions clause to shift the liability of subsurface conditions to the owner should they differ than those shown in the design package.						
22	Owner should share with contractor his loss due to a steap escalation in prices.						
23	Contractor should be liable for all types of weather, even severe unpredictable weather.						
24	Contractor should verify quantities given in the Bill of Quantities before making his bid and make allowances for mistakes.						
25	Owner should guarantee to make his inspection and review of submittals within certain time, after which, he should compensate contractor for delay.						

APPENDIX II

CONTRACTOR CLASSIFICATION

CATEGORY	CLASSIFICATION				
	1	2	3	4	5
BUILDINGS	>200	200	50	15	5
ROADS	>300	300	100	30	10
WATER & SEWAGE	>300	300	100	30	10
ELECTRICAL	>200	200	50	15	5
MECHANICAL	>200	200	50	15	5
INDUSTRIAL	>300	300	100	30	10
MARINE	>300	300	100	30	10
DAMS	>100	100	50	15	5

Legend: > : more than.
These figures represent the ceiling in Million Saudi Riyals for any one project a contractor may bid on in a given field (category).

APPENDIX III

FREQUENCIES PART B

* DESIGN CONTRACT
** CONSTRUCTION CONTRACT

Areas of Liability	OWNERS %				A/Es %				COMPOSITE %			
(Design Contract)	O	A	B	N	O	A	B	N	O	A	B	N
Detailed scope of work	30	20	50		17	17	66		24	18	58	
Provide all available info on the project	70		30		66		33		68		32	
Provide applicable owner's standards	100				83		17		92		8	
Stipulate payment method	60		40		67		33		64		36	
Stipulate methods for claims and dispute settlement	80		20		33	17	50		57	8	35	
Complete reviews within stipulated time	90		10		100				95		5	
Access to site	100				83		17		92		8	
Perform engineering and other related design services		100				83	17			92	8	
Prepare technical specifications		90	10			83	17			87	13	
Select most appropriate scale for drawings		60	40			67	33			64	36	
Provide bench marks	30	30	40		50	17	33		40	23	37	
Obtain owner's approval on design calculations	10	80	10			100			5	90	5	
Study and verify existing conditions		100				100				100		
Investigate surface and subsurface conditions		90	10		17	83			8	87	5	
Topographic, soils and hydraulic studies (if not provided by owner)		90	10			100				95	5	
Bill of quantity (material take-off)		80	20			100				90	10	
Feasibility (technical and economic) analyses		70	30		17	66	17		8	68	24	

Areas of Liability	OWNERS %				A/Es %				COMPOSITE %			
(Design Contract)	O	A	B	N	O	A	B	N	O	A	B	N
Advise owner of errors in contract or studies needed		100				100				100		
Prepare construction contract document	20	20	60		17	33	50		18	272	55	
Review and analyze bids	80	20			33	17	50		57	18	25	
Estimate construction and operation cost	20	50	30		17	33	50		18	42	40	
Control cost and keep it within target	30	60	10		17	66	17		23	63	14	
Notify owner of anticipated cost deviations (design contract cost)		100				100				100		
Use of national products	10	30	60			17	83		5	23	72	
Prepare and submit for approval all work schedules		100				100				100		
Maintaining adequate performance rate	10	80	10			66	34		5	73	22	
Third party liability	30		70		33	33	33		31	17	52	
Obtain all applicable insurances	30	20	50		17	17	66		24	18	58	
Obtain necessary licenses and governmental authorizations	10	20	70		17	50	33		13	35	52	
Coordinate with all concerned agencies			100		33	33	33		17	16	67	
Adherence to laws and customs of Saudi Arabia	10		90		17	17	66		13	8	79	
Adherence to import and customs laws	10	10	80		17	17	66		13	13	74	

Areas of Liability	OWNERS %				A/Es %				COMPOSITE %			
(Design Contract)	O	A	B	N	O	A	B	N	O	A	B	N
Sufficient offices, manpower and equipment		100			17	66	17		8	83	9	
Submitting employee resumes and qualifications for owner's approval		100			17	83			8	92		
Maintaining manpower roster	10	90			17	83			13	87		
Cost to remove and replace from project any person owner sees unfit		100				83	17			92	8	
Confidentiality of information		10	90			50	50			30	70	
Protection of owner's title to design		90	10			50	50			70	30	
Infringement of patents, copyrights and trade secrets owned by others		20	80			33	67			26	74	
Cooperation to facilitate inspection of work		80	20			100				90	10	
Design subcontractor's acts and omissions		90	10			67	33			79	21	
Obtain approval before subcontracting		100				83	17			92	8	
Guarantee no further subcontracting		100				83	17			92	8	
Issue and document change		10	90		50	17	33		25	13	62	
Liquidated damages for delay (up to 10% of contract value)		20	80		33	17	33	17	17	18	57	8

Areas of Liability	OWNERS %				A/Es %				COMPOSITE %			
(Design Contract)	O	A	B	N	O	A	B	N	O	A	B	N
Conflict of interest		50	50		17	17	66		8	34	58	
Train owner's personnel and provide offices and transportation	10	90			17	83			13	87		
Paying Zakat and income tax		80	20		17	17	66		8	49	43	

LEGEND: O: Owner; A: A/E, B: Both parties; N: none

Areas of Liability	OWNERS %				CONTRACTORS %				COMPOSITE %			
(Construction Contract)	O	C	B	N	O	C	B	N	O	C	B	N
Answer clarifications during bidding period	100				97	3			98	2		
Stipulate payment method	80		20		81		19		81		19	
Stipulate definitions and contractual responsibilities	80		20		89		11		85		15	
Stipulate methods for claims and dispute settlement	100				86	6	8		93	3	4	
Confidentiality of bid details	10		90		11	14	75		10	7	83	
Bid mistakes	20	60	20		6	44	44	6	13	52	32	3
Obtain necessary guarantees, insurances and bonds		80	20		6	94			3	87	10	
Obtain necessary licenses and permits	20	60	20		50	28	22		35	44	21	
Third party liability		10	90		33	50	11	6	16	30	51	3
Pay Zakat, taxes and duties		90	10		22	69	9		11	80	9	
Sufficient quantity and skill of labor		100				100				100		
Labor housing transportation and medical treatment		100				100				100		
Maintaining labor roster at work site		100				100				100		
Availability of resources to execute work		100				86	14			93	7	

Areas of Liability	OWNERS %				CONTRACTORS %				COMPOSITE %			
(Construction Contract)	O	C	B	N	O	C	B	N	O	C	B	N
Adequacy and suitability of equipment		100				100				100		
Provide and maintain temporary structures		100				100				100		
Provide site superintendence during execution		80	20			92	8			86	14	
Site housekeeping and sanitary conditions		100				97	3			98	2	
Site first aid trained personnel and supplies		100				100				100		
Site security (including material yard)		100				100				100		
Site safety		70	30			97	3			84	16	
Pollution control caused by work (protection of environment)		80	20			97	3			88	12	
Noise control and undue disturbance of public		90	10			97	3			94	6	
Unnecessary or improper interference with public convenience		100				92	8			96	4	
Mobilization and demobilization		100				100				100		
Dumping debris in an approved location		100				100				100		
Prepare schedules (bar charts, CPM, ...) for owner's approval		100				100				100		
Maintain progress and overcome schedule slippage		80	20			100				90	10	
Notifying owner of actual or anticipated delay		100			6	86	8		3	93	4	

Areas of Liability	OWNERS %				CONTRACTORS %				COMPOSITE %			
(Construction Contract)	O	C	B	N	O	C	B	N	O	C	B	N
Promotion of local manufacturers and suppliers		50	50		14	3	81	3	7	27	65	1
Utilize Saudi airline and maritime carriers		80	20		14	3	78	6	7	41	49	3
Maintaining procurement records		80	20			100				90	10	
Preservation of existing structures, facilities and utilities		100				94	6			97	3	
Preserve vegitation (other than marked for removal) on or near site		100				97	3			98	2	
Subcontractors' and suppliers' acts and omissions	10	90				100			5	95		
Obtain approval before subcontracting		100				97	3			98	2	
Guarantee no further subcontracting		100				97	3			98	2	
Obtaining SASO approval on imported material and equipment		20	80			86	11	3		43	45	2
Adherence to laws and customs of Saudi Arabia		80	20			56	44			68	32	
Adherence to import and customs laws		80	20			53	47			66	34	
Perform government relations activities	20	10	70			56	44		10	33	57	
Giving notices and paying fines to public authorities applicable to work	10	80	10		6	86	8		8	83	9	
Prepare as-built drawings		100			6	94			3	97		

Areas of Liability	OWNERS %				CONTRACTORS %				COMPOSITE %			
(Construction Contract)	O	C	B	N	O	C	B	N	O	C	B	N
Prepare shop and work drawings		100				100				100		
Documenting by photographs	10	80	10			89	11		5	85	10	
Delayed progress payments	80	10	10		94			6	87	5	5	3
Infringement of patents, copyrights and trade secrets owned by others		10	90		6	8	83	3	3	9	87	1
Allow owner access to all aspects of work		100				100				100		
Cooperation to facilitate inspection of work		70	30			94	6			82	18	
QA/QC (inspection and testing of work)		80	20			69	31			75	25	
Preserving articles of value, archaeological or geological interest		60	40		11	39	50		5	50	45	
Site conditions including surface and subsurface	10	10	80		6	58	36		8	34	58	
Safeguarding title to design, confidential information and patents		70	30		3	72	25		1	71	28	
Obtain owner's approval before issuing publicity releases		100				100				100		
Criminal misappropriation and misapplication		90	10			42	55	3		66	33	1
Issue and document change	10		90		81	3	16		46	1	53	
Working on undocumented change		100			14	75	8	3	7	88	4	1

Areas of Liability	OWNERS %				CONTRACTORS %				COMPOSITE %			
(Construction Contract)	O	C	B	N	O	C	B	N	O	C	B	N
Liquidated damages for delay (up to 10% of contract value)		70	30		3	89	8		1	80	19	
Liquidated damages (consequential damages)	20	30	50		8	25	67		14	27	59	
Conflict of interest		50	50			11	89			31	69	
Force majeure			50	50	8	11	58	23	4	5	54	37
Special risks (limited to outbreak of war)			50	50	14		61	25	7		55	38
Standby time controlled by owner	90		10		72		28		81		19	
Standby time controlled by contractor		100				72	28			86	14	
Maintenance period		80	20			86	14			83	17	
Cost of contractor's search for defects controlled by owner (implied)	80	10	10		89	11			85	10	5	
Cost of contractor's search for defects controlled by contractor	10	90				100			5	95		
Cooperation with other contractors working for owner in the area		90	10			81	19			85	15	
Warranty of work		100				100				100		
Guarantee for 10 years against partial or complete collapse		90		10	6	85	6	3	4	87	4	5

LEGEND: O: Owner; C: Contractor, B: Both parties; N: none

APPENDIX IV

FREQUENCIES & SEVERITY INDEX OF PART C

OWNERS

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
e	... performed to the satisfaction of the [owner or his agent]	7		3				85.00	1.5
3	Owners should have the right to remove from work any person they see unfit and contractor must replace him at his own expense.	5	4	1				85.00	1.5
c	Performed to a first class, workmanlike manner...	5	2	3				80.00	4.5
f	... performed to a satisfactory level.	5	2	3				80.00	4.5
5	Should owner suspend or terminate contract for his convenience, then he should compensate contractor for liquidated damages or loss of opportunity.	5	2	3				80.00	4.5
18	Owners in Saudi Arabia try to shift liability to the contractor or design consultant (depending on the phase of the project)	5	2	3				80.00	4.5
b	... shall be, but not limited to, ...	3	4	3				75.00	7
4	The contractor will still be liable for his compensation if he worked on change, based on good faith, without proper documentation by owner.	3	3	4				72.50	9
16	Contractor should cooperate with other contractors working for the same owner in the same area.	2	5	3				72.50	9
19	Proper sharing of risk and liability in contracts may lead to lower bids for the owner through more competition and less contingency.	4	1	5				72.50	9
g	Contractor shall allow [owner or his agent] enough time to...	3	2	5				70.00	12
12	Design consultant shall be liable for the accuracy of his estimate of construction and operation costs.	3	3	3	1			70.00	12
24	Contractor should verify quantities given in the Bill of Quantities before making his bid and make allowances for mistakes.	4	4			2		70.00	12
15	Owner should give to the design consultant all data in his possession related to project. He should be found liable otherwise.	3	1	6				67.50	14
d	... or equal.	3	2	3	2			65.00	15.5
2	Owners should guarantee due payments to contractors by submitting a payment bond or other type of guarantee.	2	4	2	2			65.00	15.5

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
6	Neither owner nor contractor shall be liable to the other for costs incurred by the other as result of any delay or failure to perform arising out of unforseeable happenings beyond either party's control.	2	2	4	1		1	63.89	17
a	Contractor shall exert all reasonable efforts to ...	1	2	7				60.00	18
14	If owner delays paying the contractor then he should pay the amounts plus damages to the contractor.	1	1	8				57.50	20
17	Contracts in Saudi Arabia are written in simple language.	2	1	5	2			57.50	20
25	Owner should guarantee to make his inspection and review of submittals within certain time, after which, he should compensate contractor for delay.		4	5	1			57.50	20
13	Owner shall be liable if he delayed his review of design submittal beyond the stipulated period.		2	7	1			52.50	23
20	Contractor should verify all site conditions including subsurface conditions. Owner should not be liable for accuracy of this data.	3	1	2	2	2		52.50	23
21	Contracts in Saudi Arabia should include a differing site conditions clause to shift the liability of subsurface conditions to the owner should they differ than those shown in the design package.	1		8	1			52.50	23
10	A serious dispute arose during the performance of the contract, the contractor will not be found liable if he suspends the contract.		2	4	2		2	50.00	25.5
11	Owner commits substantial breach of contract, then contractor should have the right to terminate contract and be compensated.	1	2	2	4		1	50.00	25.5
8	Owner could reject any bid for reason or for on reason.	2	2		3	2	1	47.22	27
9	Owner can publish information about the contract (including data about contractor) without contractor's consent.	1	1	4	2	2		42.50	28
23	Contractor should be liable for all types of weather, even severe unpredictable weather.		1	3	1	5		25.00	29

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
22	Owner should share with contractor his loss due to a steap escalation in prices.			1	5	3	1	19.44	30
7	If owner decides not to award the contract after receiving the bids, then he shall compensate bidders for all or part of the cost of preparing bids.			2	3	5		17.50	31

LEGEND: SA: Strongly Agree; MA: Moderately Agree; A: Agree; MD: Moderately Disagree; SD: Strongly Disagree; NO: No Opinion; I_S: Severity Index
R: Rank.

APPENDIX V

FREQUENCIES & SEVERITY INDEX OF PART C

A/Es

#	Statement	SA	MA	A	MD	SD	NO	I_s	R
1a	Contractor shall exert all reasonable efforts to ...	3	3					87.50	1
1c	Performed to a first class, workmanlike manner...	2	3	1				79.17	2
1d	... or equal.	2	3		1			75.00	3
1b	... shall be, but not limited to, ...	3	1		2			70.83	5
5	Should owner suspend or terminate contract for his convenience, then he should compensate contractor for liquidated damages or loss of opportunity.	2	1	3				70.83	5
16	Contractor should cooperate with other contractors working for the same owner in the same area.	2	1	3				70.83	5
18	Owners in Saudi Arabia try to shift liability to the contractor or design consultant (depending on the phase of the project)	1	2	2			1	70.00	7
1g	Contractor shall allow [owner or his agent] enough time to...	3		2		1		66.67	8.5
3	Owners should have the right to remove from work any person they see unfit and contractor must replace him at his own expense.	2	1	2	1			66.67	8.5
1e	... performed to the satisfaction of the [owner or his agent]	1	2	1	1		1	65.00	10
6	Neither owner nor contractor shall be liable to the other for costs incurred by the other as result of any delay or failure to perform arising out of unforseeable happenings beyond either party's control.	2		3	1			62.50	11.5
21	Contracts in Saudi Arabia should include a differing site conditions clause to shift the liability of subsurface conditions to the owner should they differ than those shown in the design package.	1	2	2	1			62.50	11.5
13	Owner shall be liable if he delayed his review of design submittal beyond the stipulated period.	1	2	1	2			58.33	14
15	Owner should give to the design consultant all data in his possession related to project. He should be found liable otherwise.		4		2			58.33	14
19	Proper sharing of risk and liability in contracts may lead to lower bids for the owner through more competition and less contingency.	1	1	3	1			58.33	14

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
14	If owner delays paying the contractor then he should pay the amounts plus damages to the contractor.		3	1	2			54.17	14
1f	... performed to a satisfactory level.	1	2		3			54.17	16.5
22	Owner should share with contractor his loss due to a steap escalation in prices.	1	1	1	3			50.00	18.5
25	Owner should guarantee to make his inspection and review of submittals within certain time, after which, he should compensate contractor for delay.		1	4	1			50.00	18.5
2	Owners should guarantee due payments to contractors by submitting a payment bond or other type of guarantee.	1		2	2	1		41.67	21
4	The contractor will still be liable for his compensation if he worked on change, based on good faith, without proper documentation by owner.		2	1	2	1		41.67	21
11	Owner commits substantial breach of contract, then contractor should have the right to terminate contract and be compensated.		2	2		2		41.67	21
8	Owner could reject any bid for reason or for on reason.			4	1	1		37.50	23.5
12	Design consultant shall be liable for the accuracy of his estimate of construction and operation costs.		1	1	4			37.50	23.5
17	Contracts in Saudi Arabia are written in simple language.			3	1	1	1	35.00	25
20	Contractor should verify all site conditions including subsurface conditions. Owner should not be liable for accuracy of this data.			2	4			33.33	26.5
24	Contractor should verify quantities given in the Bill of Quantities before making his bid and make allowances for mistakes.		1	2	1	2		33.33	26.5
10	A serious dispute arose during the performance of the contract, the contractor will not be found liable if he suspends the contract.			2	2	1	1	30.00	28
7	If owner decides not to award the contract after receiving the bids, then he shall compensate bidders for all or part of the cost of preparing bids.			2	2	2		25.00	29

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
23	Contractor should be liable for all types of weather, even severe unpredictable weather.				3	3		12.50	30
9	Owner can publish information about the contract (including data about contractor) without contractor's consent.				2	4		8.33	31

LEGEND: SA: Strongly Agree; MA: Moderately Agree; A: Agree; MD: Moderately Disagree; SD: Strongly Disagree; NO: No Opinion; I_S: Severity Index
R: Rank.

APPENDIX VI

FREQUENCIES & SEVERITY INDEX OF PART C

CONTRACTORS

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
25	Owner should guarantee to make his inspection and review of submittals within certain time, after which, he should compensate contractor for delay.	12	9	14			1	73.57	1
5	Should owner suspend or terminate contract for his convenience, then he should compensate contractor for liquidated damages or loss of opportunity.	14	9	9	4			72.92	2
1e	... performed to the satisfaction of the [owner or his agent]	15	11	4	2	4		71.53	3
2	Owners should guarantee due payments to contractors by submitting a payment bond or other type of guarantee.	11	13	8	3	1		70.83	4
15	Owner should give to the design consultant all data in his possession related to project. He should be found liable otherwise.	9	11	14	1		1	70.00	5
1b	... shall be, but not limited to, ...	12	14	2	5	3		68.75	6
1a	Contractor shall exert all reasonable efforts to ...	11	10	11	2	2		68.06	7
13	Owner shall be liable if he delayed his review of design submittal beyond the stipulated period.	10	4	21	1			65.97	8
4	The contractor will still be liable for his compensation if he worked on change, based on good faith, without proper documentation by owner.	11	12	4	6	3		65.28	9
19	Proper sharing of risk and liability in contracts may lead to lower bids for the owner through more competition and less contingency.	9	4	18	2		3	65.15	10
14	If owner delays paying the contractor then he should pay the amounts plus damages to the contractor.	9	5	20	2			64.58	11
18	Owners in Saudi Arabia try to shift liability to the contractor or design consultant (depending on the phase of the project)	8	3	24	1			62.50	12
12	Design consultant shall be liable for the accuracy of his estimate of construction and operation costs.	8	4	20	4			61.11	13
21	Contracts in Saudi Arabia should include a differing site conditions clause to shift the liability of subsurface conditions to the owner should they differ than those shown in the design package.	4	9	20	2		1	60.71	14

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
11	Owner commits substantial breach of contract, then contractor should have the right to terminate contract and be compensated.	7	5	18	3	2	1	58.57	15
10	A serious dispute arose during the performance of the contract, the contractor will not be found liable if he suspends the contract.	6	9	9	8	1	3	58.33	16
3	Owners should have the right to remove from work any person they see unfit and contractor must replace him at his own expense.	4	13	11	6	3		57.64	17
1g	Contractor shall allow [owner or his agent] enough time to...	8	9	9	4	6		56.25	18.5
16	Contractor should cooperate with other contractors working for the same owner in the same area.	4	5	24	2	1		56.25	18.5
1c	Performed to a first class, workmanlike manner...	6	8	14	4	4		55.56	20
22	Owner should share with contractor his loss due to a steap escalation in prices.	6	3	21	3	3		54.17	21
24	Contractor should verify quantities given in the Bill of Quantities before making his bid and make allowances for mistakes.	6	2	22	3	3		53.47	22
1d	... or equal.	7	5	12	9	3		52.78	23
6	Neither owner nor contractor shall be liable to the other for costs incurred by the other as result of any delay or failure to perform arising out of unforseeable happenings beyond either party's control.	5	5	15	10	1		52.08	24
7	If owner decides not to award the contract after receiving the bids, then he shall compensate bidders for all or part of the cost of preparing bids.	3	5	17	7	2	2	50.00	25
1f	... performed to a satisfactory level.	3	5	18	7	3		48.61	26
17	Contracts in Saudi Arabia are written in simple language.		7	21	4	3	1	47.86	27
23	Contractor should be liable for all types of weather, even severe unpredictable weather.	2	8	11	7	8		42.36	28
8	Owner could reject any bid for reason or for on reason.		4	11	19	2		36.81	29

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
20	Contractor should verify all site conditions including subsurface conditions. Owner should not be liable for accuracy of this data.	1	2	18	6	9		36.11	30
9	Owner can publish information about the contract (including data about contractor) without contractor's consent.	2	4	7	9	14		29.86	31

LEGEND: SA: Strongly Agree; MA: Moderately Agree; A: Agree; MD: Moderately Disagree; SD: Strongly Disagree; NO: No Opinion; I_S: Severity Index
R: Rank.

APPENDIX VII

FREQUENCIES & SEVERITY INDEX OF PART C

COMPOSITE

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
5	Should owner suspend or terminate contract for his convenience, then he should compensate contractor for liquidated damages or loss of opportunity.	21	12	15	4			74.04	1
1e	... performed to the satisfaction of the [owner or his agent]	23	13	8	3	4	1	73.53	2
1b	... shall be, but not limited to, ...	18	19	5	7	3		70.19	3
1a	Contractor shall exert all reasonable efforts to ...	15	15	18	2	2		68.75	4
15	Owner should give to the design consultant all data in his possession related to project. He should be found liable otherwise.	12	16	20	3		1	68.14	5
25	Owner should guarantee to make his inspection and review of submittals within certain time, after which, he should compensate contractor for delay.	12	14	23	2		1	67.65	6
18	Owners in Saudi Arabia try to shift liability to the contractor or design consultant (depending on the phase of the project)	14	7	29	1		1	66.67	7
2	Owners should guarantee due payments to contractors by submitting a payment bond or other type of guarantee.	14	17	12	7	2		66.35	8
19	Proper sharing of risk and liability in contracts may lead to lower bids for the owner through more competition and less contingency.	14	6	26	3		3	65.82	9
3	Owners should have the right to remove from work any person they see unfit and contractor must replace him at his own expense.	11	18	14	7	2		63.94	10.5
4	The contractor will still be liable for his compensation if he worked on change, based on good faith, without proper documentation by owner.	14	17	9	8	4		63.94	10.5
1c	Performed to a first class, workmanlike manner...	13	13	18	4	4		62.98	12
13	Owner shall be liable if he delayed his review of design submittal beyond the stipulated period.	11	8	29	4			62.50	13
14	If owner delays paying the contractor then he should pay the amounts plus damages to the contractor.	10	9	29	4			62.02	14

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
16	Contractor should cooperate with other contractors working for the same owner in the same area.	8	11	30	2	1		61.06	15
1g	Contractor shall allow [owner or his agent] enough time to...	14	11	16	4	7		60.10	16.5
12	Design consultant shall be liable for the accuracy of his estimate of construction and operation costs.	11	8	24	9			60.10	16.5
21	Contracts in Saudi Arabia should include a differing site conditions clause to shift the liability of subsurface conditions to the owner should they differ than those shown in the design package.	6	11	30	4		1	59.31	18
1d	... or equal.	12	10	15	12	3		57.69	19
6	Neither owner nor contractor shall be liable to the other for costs incurred by the other as result of any delay or failure to perform arising out of unforseeable happenings beyond either party's control.	9	7	22	12 .	1	1	55.39	20
1f	... performed to a satisfactory level.	9	9	21	10	3		55.29	21
11	Owner commits substantial breach of contract, then contractor should have the right to terminate contract and be compensated.	8	9	22	7	4	2	55.00	22
24	Contractor should verify quantities given in the Bill of Quantities before making his bid and make allowances for mistakes.	10	7	24	4	7		54.33	23
10	A serious dispute arose during the performance of the contract, the contractor will not be found liable if he suspends the contract.	6	11	15	12	2	6	53.80	24
17	Contracts in Saudi Arabia are written in simple language.	2	8	29	7	4	2	48.50	25
22	Owner should share with contractor his loss due to a steap escalation in prices.	7	4	23	11	6	1	47.55	26
7	If owner decides not to award the contract after receiving the bids, then he shall compensate bidders for all or part of the cost of preparing bids.	3	5	21	12	9	2	40.50	27

#	Statement	SA	MA	A	MD	SD	NO	I_S	R
20	Contractor should verify all site conditions including subsurface conditions. Owner should not be liable for accuracy of this data.	4	3	22	12	11		38.94	28
8	Owner could reject any bid for reason or for on reason.	2	6	15	23	5	1	38.73	29
23	Contractor should be liable for all types of weather, even severe unpredictable weather.	2	9	14	11	16		35.58	30
9	Owner can publish information about the contract (including data about contractor) without contractor's consent.	3	5	11	13	20		29.81	31

LEGEND: SA: Strongly Agree; MA: Moderately Agree; A: Agree; MD: Moderately Disagree; SD: Strongly Disagree; NO: No Opinion; I_S: Severity Index
R: Rank.

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VITA

Mr. **MAHER TALAT AL-BARGHOUTHI** was born in Al-Quds, Palestine in 1964. Upon graduating from Friends Boys School in 1982, he enrolled at King Fahd University of Petroleum and Minerals (KFUPM). He graduated with a B. Sc. degree in Mechanical Engineering in May 1986. He re-enrolled at KFUPM in the Construction Engineering and Management Program in 1989 as a part-time student.

Mr. Al-Barghouthi worked as a Plant Engineer at Al-Jubail Petrochemical Plant from '86-'88. He then joined Saudi Aramco in '88 to work as a Project Engineer. He attended several management and technical courses and obtained affiliations to several technical societies. He also became certified by the American Association of Cost Engineers as a Certified Cost Engineer in 1989.